The OIL and GAS JOURNAL

PRODUCING REFINING MARKETING

VOL. 24. NO. 34. TULSA, OKLAHOMA, JANUARY 14, 1925

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Crude Price Increase Is Big Question

Highest daily average estimated production this year, week ended May 30, 2,347,984 bbls. Lowest January 3, 1,911,730 bbls.

Longer Present Quotations Are Maintained the More Benefit Will Accrue to the Oil Industry as a Whole

By Andrew M. Rowley

Highest daily average estimated light oil production this year, week ended January 17, 1,525,220 bbls. Lowest July 18, 1,374,173 bbls.

While leaders of the petroleum industry in all sections of the United States are starting for Los Angeles to attend the annual convention of the American Petroleum Institute, the chief question in the minds of both producers and refiners is how long present crude oil prices can be maintained in the face of the steady spread of premium paying in a majority of the fields in the Mid-Continent and Eastern territory. Eastern producers are holding their oil for higher prices, causing somewhat of a congestion in pipe line operations while there is a good demand for Mid-Continent crude resulting in a number of buyers offering premiums to obtain connections.

Present crude oil prices should be maintained as long as possible. All phases of the industry will be benefited greatly if no increase in prices is made for at least 60 days, although it is extremely doubtful if a raise can be postponed for that long because of the fact a number of buyers are losing connections to companies paying premiums. The time is long past when oil men can view the situation from the angle of local conditions. These local conditions can force crude price readjustments but just as surely as they do will the sections where they are made feel the effect of these price changes on the general situation.

California continues to dominate the general situation. The completion of a 1,500-barrel well in the Long Beach extension, extending the field a short distance, is but an instance of the continued productivity of that State. Previous completions in the extension have averaged less than 500 barrels and former estimates of the peak of production of Long Beach may go by the boards in the light of the most recent well. In addition it must be remembered California oil fields have a long life and California operators employ the most modern methods.

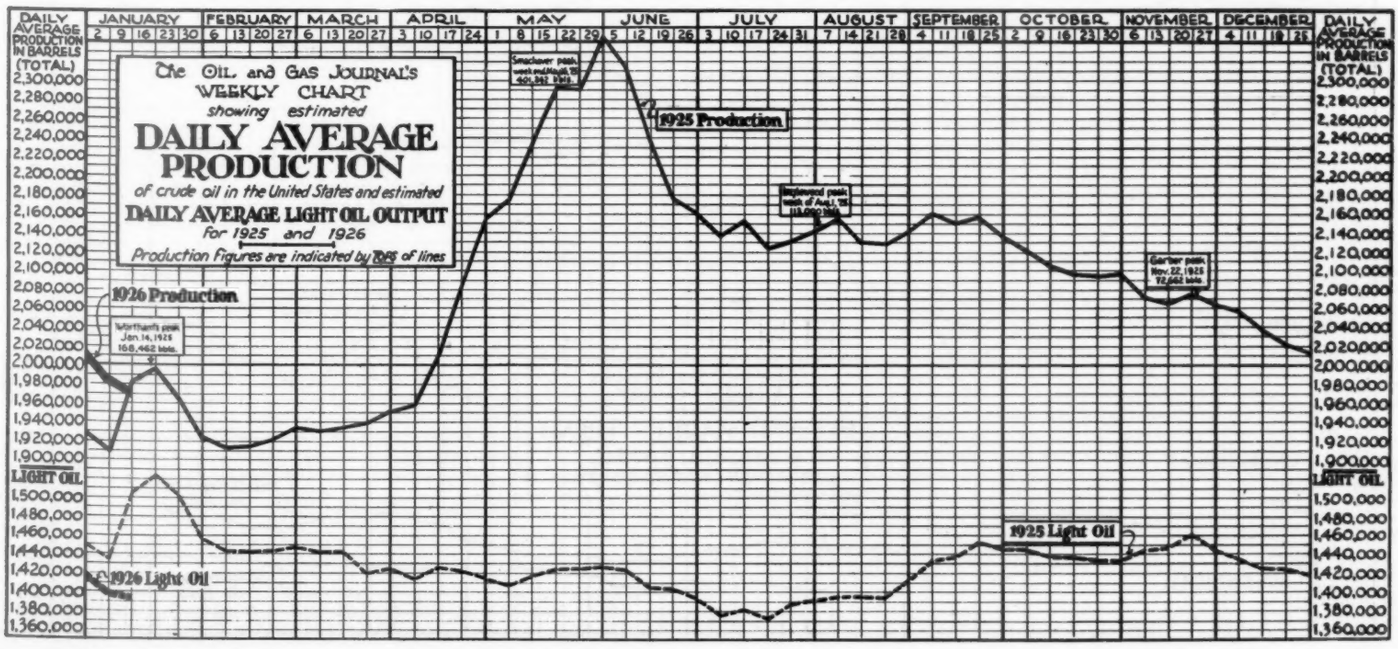
Higher crude oil prices in the Mid-Continent and East must mean higher gasoline prices. Both mean a greater differential favoring California products. The big buyers along the Atlantic Seaboard on whom the Mid-Continent and Eastern producers and refiners depend for a sale of their products naturally will turn to California when California products can be delivered much cheaper than crude and gasoline from other sections. Of what benefit would higher crude or gasoline prices be to Mid-Continent and Eastern oil men if the market for their products were automatically curtailed?

PRODUCTION IN THE UNITED STATES

Estimated daily average production of light and heavy gravity crude oil in the United States for week ended January 9, and a comparison with the previous week follows:

	Jan. 9		Jan. 2	
	Light	Heavy	Light	Heavy
Oklahoma—				
Tonkawa	45,640	.....	40,810	.....
Burbank	44,595	.....	44,945	.....
Other Osage Fields	32,945	.....	33,045	.....
Cushing and Shamrock	22,615	.....	22,590	.....
Bristow and Eastern Bristow	31,725	.....	31,435	.....
Cromwell	20,195	.....	20,445	.....
Papoose	13,190	.....	12,940	.....
Garber	28,935	.....	32,045	.....
Blackwell-Braman	9,325	.....	8,725	.....
Davenport	20,295	.....	19,745	.....
Thomas	14,690	.....	15,020	.....
Northern Miscellaneous	102,550	.....	102,770	.....
Southern Fields	62,985	.....	63,130	.....
Total Oklahoma	449,685	.....	447,645	.....
North Louisiana	44,201	.....	44,102	.....
Arkansas—				
El Dorado and Calion	7,795	.....	7,845	.....
Smackover Light	19,410	.....	19,590	.....
Smackover Heavy	.....	153,690	.....	158,030
Stephens and Nevada	3,270	.....	3,265	.....
Total Arkansas	30,475	153,690	30,700	158,030
North Central Texas	168,337	.....	170,935	.....
Powell	35,800	.....	36,100	.....
Mexia, Currie, Richland, etc.	17,945	.....	18,392	.....
Wortham	13,685	.....	13,865	.....
Kansas	99,880	.....	101,410	.....
Total Mid-Continent Area	860,008	153,690	863,149	158,030
Gulf Coast	.....	93,170	.....	94,785
Southwest Texas	.....	39,796	.....	40,495
Eastern	99,800	.....	102,750	.....
Rocky Mountain Area	104,369	.....	104,034	.....
California—				
Santa Fe Springs	50,500	.....	51,000	.....
Long Beach	111,500	.....	111,000	.....
Huntington Beach	45,000	.....	45,000	.....
Torrance	5,000	26,500	5,000	26,500
Dominguez	25,000	.....	25,000	.....
Rosecrans	22,500	.....	23,000	.....
Inglewood	27,000	33,000	28,000	34,500
Remainder of State	47,000	233,000	44,000	233,000
Total California	333,500	292,500	332,000	294,000
Total United States	1,397,677	579,156	1,401,933	587,310
Grand Total	1,976,833		1,989,243	

→ **Total Decrease, 12,410 Bbls.; Light Oil Decrease, 4,256 Bbls.** ←



Export Buying Aids Gasoline Market

Actual Purchases of Higher Gravity Grades and Rumors Regarding U.S. Motor Offset Dullness in Domestic Demand

By Neil Williams

Activities of export buyers featured the Oklahoma (Group 3) refined market the past week and furnished the topic of much speculation. While there was considerable uncertainty as to the extent and nature of the actual purchases, well circulated rumors renewed strength in the general gasoline situation.

Refined prices, which were firm a week ago after a period of weakness, began to sag the middle of the week but when reports of extensive export purchases the last of the week were heard gasoline prices again firmed. Actual market prices were not materially advanced as a result of the rumors, the strengthening being felt only in the elimination of concessions.

Actual purchases of gasoline for export were the source of much speculation. Early reports were to the effect that three leading export buyers had bought 475 cars, or between 4,000,000 and 5,000,000 gallons, of U. S. Motor (58-60 437) gasoline from Oklahoma and Kansas refiners at 9¼ cents. These purchases were positively denied both by the export buyers and the refiners who were supposed to have made the sales.

While many were inclined to believe that some purchases of U. S. Motor gasoline were made by other companies no definite check of these could be obtained from any source. One of the exporters mentioned made known that his company had orders for 500,000 gallons of U. S. Motor gasoline but, as he did not know whether the gasoline was for export or domestic, he had not acted on the purchases at the time the reports were circulated.

It was admitted, however, that exporters had bought a substantial quantity of higher gravity gasolines from Oklahoma, North Texas and Arkansas refiners and still were in the market for additional gasoline. These purchases Tuesday had amounted to between 8,000,000 and 10,000,000 gallons, conservatively estimated after a check of refiners reported to have made the sales.

While prices paid refiners varied the exporters were offering 12½ cents North Texas for 64-66 375, and the Atlantic Refining Co. was reported to have bought more than 1,100,000 gallons in North Texas at 12⅝ cents. Favorable offers also were made by some Oklahoma refiners but several of these had not been able to fill their orders Tuesday because of corrosion test requirements. One Oklahoma refiner alone reported he had sold between 3,000,000 and 4,000,000 gallons of higher grade gasolines.

These purchases produced an especially good position in higher gravity gasolines for Oklahoma refiners and no doubt were largely responsible in the strengthening in the U. S. Motor grade. In addition to this, one exporter made known Monday that his company had purchased approximately 14,000,000 gallons of higher gravity gasoline during December.

Uncertainty as to the course of the Carter Oil Co. (Standard Oil Co. of New Jersey) in renewing 64-66 375 contracts for 1926 were set at rest the past week when it became known that nearly all these contracts had been renewed. These contracts will tie up approximately 4,000,000 gallons of gasoline a month during the year. Before this there had been some doubt expressed as to whether these contracts would be renewed, resulting in some speculation as how the spot market would react if this additional contract gasoline were placed on the open market.

One noticeable development during the week was the effort on the part of larger Oklahoma refiners to prevent a rapid rise in market prices of gasoline. These refiners explained that any marked advance in prices at this time would result in many refiners increasing crude runs to stills materially, thus building up burdensome stocks in the face of slow domestic demand at this time and bring about a recurrence of last spring and summer's poor refined markets.

As it is, crude runs to stills on Jan-

(Continued on Page 229)

REFINED MARKET BAROMETER

Refined markets on the whole were unchanged the past week, the chief development being the purchase of substantial quantities of higher gravity gasoline in the Mid-Continent for export. Gasoline prices were higher in some parts of the Mid-Continent as a result of the purchase but generally only a firmer tone was apparent. Kerosene was firm to strong with the product almost unobtainable for immediate shipment in some districts. Fuel oil and gas oil were somewhat spotted as to demand, the movement in Mid-Continent and Middle West being sluggish while in the Gulf Coast and Atlantic Seaboard increased demand resulted in higher prices. Lubricants showed a better tone in some areas. Natural gasolines were quiet. The cold weather in North and Middle Western States caused increased demand for distillates in some districts.

Mid-Continent—Export buying of higher gravity gasolines and rumors of U. S. Motor gasoline purchases renewed firmness in Mid-Continent gasoline markets. This was accompanied by higher prices on some grades of gasoline in North Texas. Fuel oil and gas oil continued firm although sluggish in some areas. Kerosene almost unobtainable with prices highest in a year. Natural gasolines quiet with lower prices. Lubricant demand holding up.

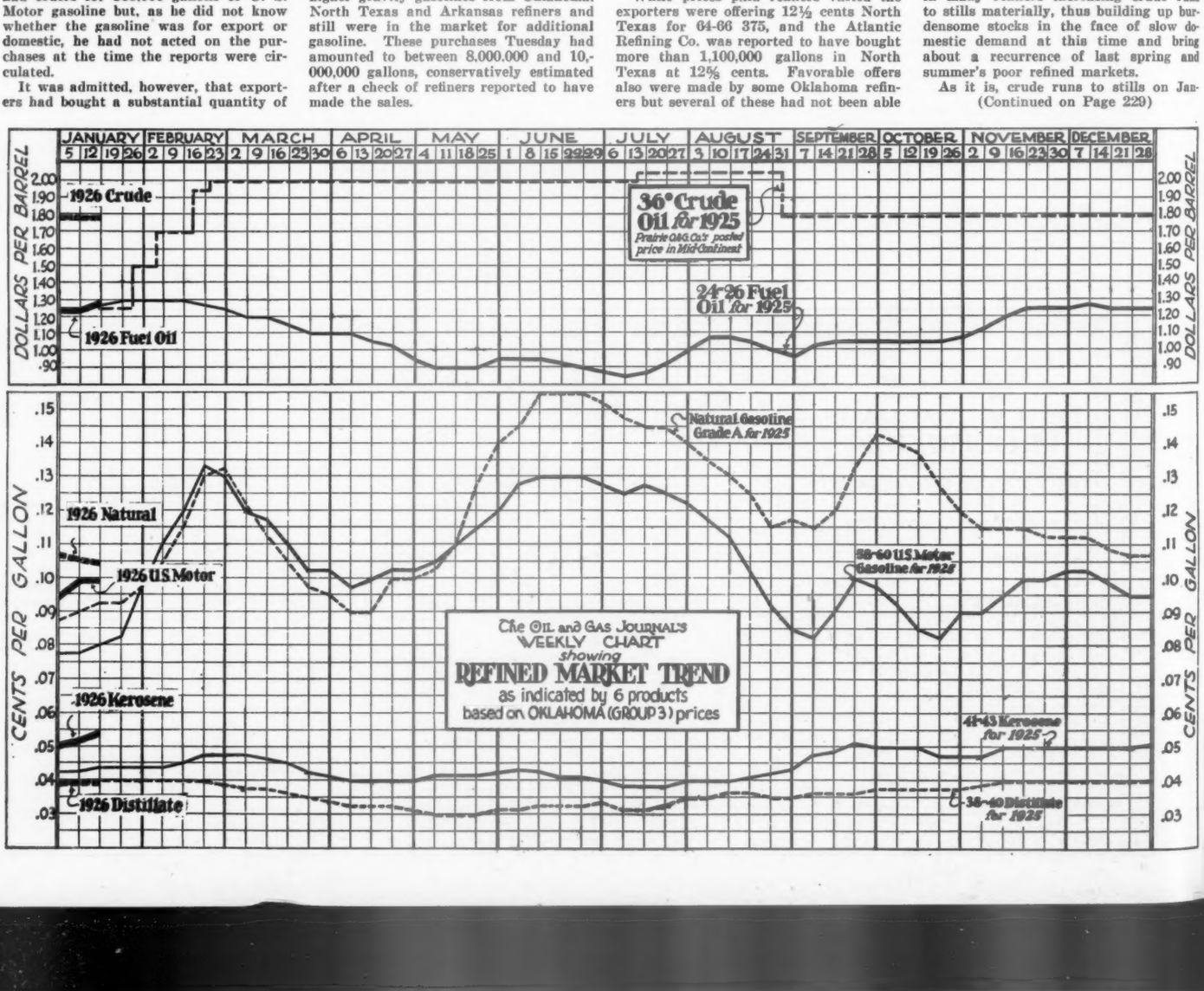
Atlantic Seaboard—Atlantic Seaboard refined markets continued firm. Gasoline situation on more settled basis. Fuel oil and gas oil prices advanced. Lubricants improved. Petrolatum prices higher. Improved export demand felt.

Pennsylvania—Pennsylvania refined markets sluggish. Gasoline prices steady but demand for kerosene and naphthas small. Fuel movements fair. Lubricants inactive. Wax weak.

California—General California refined situation unchanged.

Chicago—Demand for all refined products except kerosene and gas oil slow. Prices, however, continued firm. Inquiries for fuel oil increased but buying slight. Lubricants unchanged.

Gulf Coast—Fuel oil and gas showed increased strength with higher prices. Zero cold test lubricant demand improved.



Los Angeles Ready to Greet Its Guests

California Oil Men Prepare Program of Entertainment for Delegates and Visitors to American Petroleum Institute Meeting

By L. P. Stockman

LOS ANGELES, Calif., Jan. 9.—California, the land of perpetual sunshine, flowers and vast mineral and agricultural resources, will play host January 19, 20 and 21 to the greatest congregation of business executives ever called together when the sixth annual meeting of the American Petroleum Institute gets under way at the Biltmore Hotel. Without doubt, this meeting of the Institute will be the best attended and most successful since the birth of the organization. California, the home of hospitality and, particularly Los Angeles, is honored to be favored with the presence of so many distinguished guests. For the benefit of those who are coming to California for the first time, it would not be amiss to survey conditions in a general way and point out some spots of interest.

Plenty of Entertainment

Heeding to that old familiar call, "when do we eat," I will first enumerate, excluding, of course, the grills at the Biltmore, Ambassador and Alexandria Hotels, a few of the many restaurants and cafes. In the business district one can find an air of refinement at the Victor Hugo and Grand Avenue and Cafe Lafayette on West Seventh Street opposite beautiful Westlake Park. Other restaurants include Taite's, Herbert's, Haggard's. The Bull Pen, which specializes in steaks a la plank; the Marine, featuring sea foods, and the Mary Louise Tea Room for the ladies. Excellent luncheons and dinners are also to be had at several exclusive caterers, such as the Elite, Neve's Petitfils and Paulais. The Athletic Club and University Club will prove very popular with the bachelors.

There are numerous cafeterias in Los Angeles, the largest in the world being the Boos Brothers establishment on Hill Street opposite the Biltmore Hotel. Years ago the cafeteria was regarded as an inexpensive place to dine but today the cafeteria is a dignified establishment patronized by a class of people commensurate with the location and cleanliness of the institution. The Leighton industries also have several well appointed self-service cafes located at vantage points throughout the city. The two largest are in the Loew State Theater Building at Seventh and Broadway and in the Arcade Building on Broadway between Fifth and Sixth. Both Boos Brothers and Leighton provide a high class of entertainment during luncheon and dinner hours. In addition to the hotels mentioned above there are the Clark, Stowell, Rosslyn, Van Nuys, Commodore, Ritz, all within reach of the city's center.

Many interesting trips have been arranged by the entertainment committee, the most popular of which will probably be that to Catalina Island, the gem of the Pacific, or up to Mt. Lowe, high above the clouds, from which a wonderful view can be had of the entire coast line. No special trip has been outlined to take in the orange groves at Riverside and San Bernardino, as most eastern trains are routed this way. The visits to the motion picture studios and various nearby beaches will also prove popular. For those who enjoy the theater, the city offers the Biltmore and Mason, which play to traveling companies. The Orpheum and several motion picture houses are also located in the downtown area. Grauman's Egyptian Theater and the Montmartre Cafe in Hollywood should also prove attractive. The Beaches, Venice, Long Beach, Ocean Park, Santa Monica and Redondo offer many forms of amusement from bathing to pleasure piers.

It is needless at this time to point out California's remarkable record from a production standpoint or to stress its dominant position in the industry today, as it holds the key to the future and much depends upon development during the next six months. Notwithstanding the fact that California's production during 1923-24 resulted in a very chaotic condition in the petroleum industry, it added many millions to the State's wealth and the output during 1924 and 1925 has been and will continue to be an important factor in the growth of the entire West.

Property owners at Santa Fe Springs, Long Beach, Huntington and Torrance all received liberal bonuses and royalty payments, much of which has been invested in Los Angeles real estate and the development of these and other fields in southern California, together with the expansion and erection of new refineries, has had a very decided effect on Los Angeles.

Lavish Hospitality

From the California membership of the American Petroleum Institute and the Chamber of Mines and Oil there has been chosen an executive committee to be in charge of all arrangements for the entertainment of the visitors at the Los Angeles convention. Paul N. Boggs, assistant general manager of the Union Oil Co., is chairman. Other members are Clarence M. Fuller of the Richfield Oil Co., Lionel Barneson of the General Petroleum Corp., W. W. Copp of the Marland Oil Co., W. R. Guiberson of the Guiberson Corp., L. J. King of the Associated Oil Co., A. B. Macbeth of the Southern California Gas Co., W. C. McDuffie of the Shell Co., E. J. Miley of the Miley Oil Co., F. C. Van Deinse of the Ventura Refining Co., and Phillip Patchin of the Standard Oil Co.

Friday, January 22, will be devoted to entertainment. A golf tournament will be held at one of the country club courses adjacent to Los Angeles. A tour of oil fields will start at Inglewood and make stops at Athens-on-the-Hill, Dominguez, Torrance, Watson Junction, Signal Hill, Santa Fe Springs, Murphy-Coyote, Whittier and Montebello. The visitors will be given an opportunity to look over Watson Junction, one of the great refinery districts, where more than 100,000,000 bbls. of petroleum are in storage. The refineries of the Pan American Petroleum Co. and Shell Co. of California are located at or near Watson Junction.

Members of the banquet committee are planning to make this an event which will long be remembered by the visitors. W. R. Guiberson, chairman of the Institute reception committee of the Los Angeles Chamber of Mines and Oil, is preparing several extraordinary features. Addresses will be delivered by retiring President Edgar A. Pew and the president-elect, but an effort will be made to have a minimum of oratory and a maximum of entertainment.

The banquet is to be a swag affair, and details concerning it are being carefully guarded. The banquet will be given an early-days' Spanish setting, even to the decorations, and the committee has arranged to have a galaxy of beautiful singing and dancing girls, garbed in genuine Spanish costumes, to frolic through the aisles, while the banquet is in progress, singing and dancing the songs of Mexico and old Spain. The finishing touch, for the banquet program, will be put on, it is expected, by the male chorus of 40 voices from the "Student Prince," a musical comedy now running at the Biltmore Theater.

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American Petroleum Institute Convention Program

The American Petroleum Institute makes the following announcement regarding the program for its Sixth Annual Meeting, to be held at the Biltmore Hotel, Los Angeles, Calif., January 19, 20 and 21, 1926:

MONDAY, JANUARY 18

On Monday, January 18, 1926, the day prior to the convening of the Sixth Annual Meeting, the following named committees will meet at the time fixed by the chairman of each committee in his notice to the members:

COMMITTEE MEETINGS AT LOS ANGELES

9:00 a. m. Committee D-2 (A. S. T. M.) on Petroleum Products and Lubricants. (Room 202).

9:30 a. m. Committee on Standardization of Specifications for Steel and Iron Pipe for Oil Country Tubular Goods. (Room 245).

9:30 a. m. Committee on Standardization of Rig Irons. (Room 220).

9:30 a. m. Committee on Standardization of Wire Rope and Manila Cordage. (Room 223).

9:30 a. m. Committee on Standardization of Standard Rigs and Derricks (Room 216).

9:30 a. m. Committee on Standardization of Pumping Equipment and Engines as Applied to the Production of Oil. (Room 241).

9:30 a. m. Committee on Standardization of Rotary Drilling Equipment. (Room 239).

9:30 a. m. Committee on Standardization of Oil Field Boilers. (Room 219).

9:30 a. m. Committee on Standardization of Steel Storage and Production Tanks, as Applied to the Production of Oil. (Room 218).

9:30 a. m. Committee on Standardization of Belting (Room 286).

10:00 a. m. Committee on Testing Methods and Specifications. (Room 202).

10:00 a. m. Committee on Uniform Accounting. (Room 203).

11:00 a. m. Special Committee on Method of Testing Vapor Pressure. (Room 207).

11:00 a. m. General Committee on Railroad Transportation and Its Sub-Committees. (Conference Room No. 7).

2:00 p. m. Committee on Public Relations. (Room 221).

2:00 p. m. Committee on Fire Prevention. (Room 202).

2:00 p. m. Committee on Standardization of Cable Drilling Tool Joints. (Room 286).

EVENING

8:00 p. m. The California Committee on Reception and Entertainment is arranging to give an informal reception and smoker in the foyer of the ballroom at the Biltmore Hotel.

TUESDAY, JANUARY 19—MORNING

10:30 a.m. Meeting of the Board of Councillors. (To nominate candidates for election as members of the Board of Directors). (Ballroom).

AFTERNOON

2:30 p. m. General Session: (Ballroom)

"Welcome to California": Thomas A. O'Donnell, California Petroleum Corp.

The President's Address: J. Edgar Pew.

Address: Paul Shoup, Southern Pacific Co.

Report of Board of Councillors and Election of Directors.

EVENING

8:00 p. m. General Session: (Ballroom).

Memorial service for the late Alfred C. Bedford.

Address: Mark L. Requa.

WEDNESDAY, JANUARY 20

Note—There will no general session on Wednesday. The morning and afternoon will be devoted to group sessions, arranged by general topics, at which the various subjects will first be treated in addresses by selected speakers. After each speaker has finished, opportunity will be given for general discussion of the subject.

MORNING

10:30 a. m. Meeting Board of Directors. (Conference Room 4). (Luncheon for members of the board at noon in Conference Room 7).

10:00 a. m. Group Meetings:

Group 1—General Topic: Standardization of Oil Field Equipment. (Ballroom).

"Standardization of Belting." Committee Report: A. H. Rines, National Chairman.

"Standardization of Oil Field Boilers." Committee Report: A. B. Steen, National Chairman.

"Standardization of Cable Drilling Tool Joints." Committee Report: Thomas Fleming, Jr., National Chairman.

"Standardization of Standard Rigs and Derricks." Committee Report: W. W. Fondren, National Chairman.

"Standardization of Steel and Iron Pipe for Oil Country Tubular Goods." Committee Report: J. Edgar Pew, National Chairman.

Group 2—General Topic: Motor Fuel and Motor Lubrication. (Music Room).

"A New Gasoline Test Method." W. S. James, Associated Oil Co.

"Effects of Fuel and Engine Design on Starting." S. W. Sparrow, United States Bureau of Standards.

"Anti-Knock Gasolines and the High Compression Engine." A. L. Clayden, Sun Oil Co.

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Basic Change in California's Problem

Over Production of Refined Products Overshadows Excess Crude Supply. Effect on Rest of the Country

By Charles E. Bowles

In three years California's problem has changed from trying to take care of a sudden and enormous increase in crude oil output to trying to find a market for a rapidly increasing refinery output.

She still has a crude oil problem in the shape of both excess current production and heavy stocks of crude oil. But the more pressing problem today is the excess production of refined products, principally fuel oil and gasoline.

Back in 1922 "the picture" was different. California was then producing an average of 380,000 bbls. of crude a day—her refineries were running to stills 282,000 bbls. of crude a day—and had a rated capacity of 324,760 bbls. a day on January 1, 1922, with plants actually operating with an aggregate capacity of 314,360 bbls.

There was a ready market for the 105,000 bbls. a day of crude that did not go through the stills. Crude oil in pipe lines and tank farms, on leases and at refineries was slightly over 50,000,000 bbls.

In the first 10 months of 1925 California produced an average of 628,000 bbls. of crude a day—ran 497,000 bbls. of crude a day to stills—and her refineries, on May 1, had a rated capacity of 743,720 bbls. a day. The plants in actual operation had a rated capacity of 700,620 bbls. a day.

The crude that does not go through the stills today (131,000 bbls. a day) is not much more than in 1922 (105,000 bbls. a day). Isolate that fact from the rest of the story and it is very misleading. Crude in pipe lines, tank farm, lease and refinery storage on October 31, 1925, totaled close to 125,000,000 bbls., of which probably 20,000,000 bbls. were fuel oil, now included with heavy crude.

The situation in 1922 was one in which crude production, refinery capacity, crude run to stills and the output of refined products were nicely balanced to normal markets—markets that had not yet been subjected to the drive that results from abnormal current output plus heavy and growing stocks.

There are strong indications, however, that the worst of the storm is over. California stood the "jolt" of three big fields in 1923 while the rest of the United States was taking the jolt of peak production of the Salt Creek Field and four major fields in the Mid-Continent.

California's biggest problem today is finance and markets—finance to carry huge stocks of crude and refined—and markets to absorb products from refineries whose capacity today is 100,000 bbls. in excess of the current production of crude oil.

In the tremendous effort to cope with 720,000 bbls. a day in 1923 compared with 380,000 bbls. a day in 1922—and to take care of this new surplus of 340,000 bbls. a day, three things naturally happened—and in a natural sequence: (1) crude was shipped; (2) crude was stored as rapidly as storage could be built, and (3) old refineries were enlarged and new refineries were built. And herein lies, potentially, one of the most serious phases of California's present situation.

Until the recent decline in Salt Creek the production of crude oil in the Rocky Mountain area was always well ahead of refining capacity. In the Mid-Continent the production of crude oil has for years been hundreds of thousands of barrels ahead of refining capacity. On the other hand, the Gulf Coast has, in recent years, become a great refining area—and the upper Atlantic Coast area has been the heart of the refining industry since there has been an industry.

In three years California has done the unusual, the potentially dangerous thing, built her refinery capacity ahead of her current crude production.

From the keen competition to get enough crude to keep refineries going at something like their "rated" capacities probably more damage has come to the price structure of crude oil, directly, and of refined products indirectly, than from any other source.

The abnormal situation that prevailed a few years ago, and one angle of which found expression in the building of too many "refineries" of a certain type, especially in the Mid-Continent, has passed. And with its passing has come a different approach in which the more successful of the newer refining units have been settling down to the economics and technology of refining. And while the older refining units long ago saw "the handwriting on the wall" there seems today still to be a great many refiners that think more about trying to keep their plants running "at capacity" than they do about whether the aggregate output of the refineries serving the area in which their products are marketed checks up "safely" with the absorbing capacity of the market.

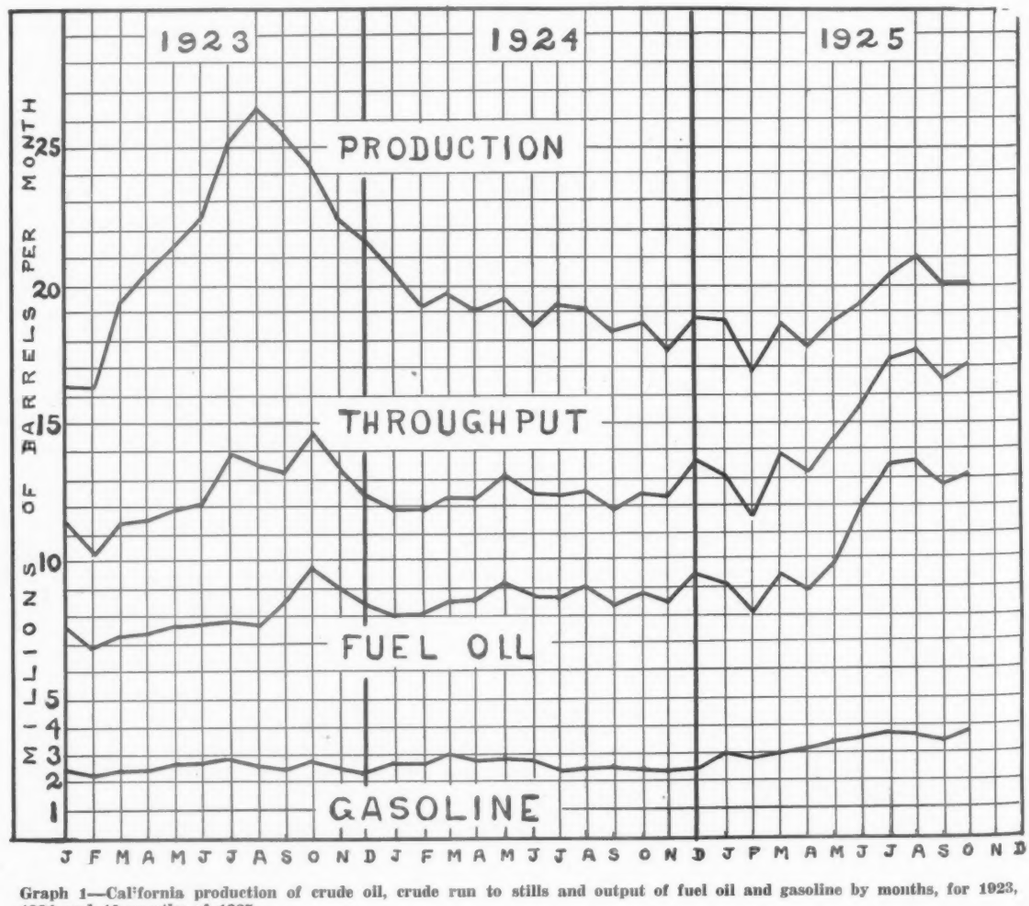
Failure, either to know the underlying situation as to the actual relation between refinery output and market conditions, whether local, State, areal, national or international—or failure to be guided by these underlying conditions, which to a surprisingly large degree are measurably knowable, has lost the industry more potential and legitimate profits than could ever have been lost in the producing end, through non-conservation.

The situation in California today seems to be clearly defined from a physical standpoint: a more or less "stabilized" production that during 1926 will average probably over 600,000 bbls. a day—a refining capacity of over 700,000 bbls. a day—refinery runs that will undoubtedly average well over 500,000 bbls. a day for 1926. Production jumped 340,000 bbls. a day in 1923—and refinery runs jumped 129,000 bbls. In 1924 production dropped 95,000 bbls. a day—and refinery runs stood still. In 1925 production stood at substantially the same daily average as in 1924, but refinery runs increased 87,000 bbls. a day. In other words, refinery runs "rode up" with production—but did not "ride down." They seldom do. In practically every industry, the manufacturers face is nearly always turned to his markets—rather than to his source of raw materials. He thinks that it will be easier to put a little more pressure on his selling organization and find larger markets than to curtail his factory operations. The rosy promise of markets is more compelling than the cold facts of raw materials. One is fact—and the

California's Daily Average Crude Production, Refinery Capacity, Crude Run to Stills and Recoveries of Fuel Oil and Gasoline for 1922, 1923, 1924 and 10 Months of 1925.

Items—	1922	1923	1924	1925
Production	380,000	720,000	625,000	628,000
Daily average crude run to stills	282,000	411,000	410,000	497,000
Daily average crude not run to stills	105,000	309,000	215,000	131,000
*Rated capacity of all refineries	324,760	.....	674,720	743,720
*Rated capacity of operating refineries	314,360	.....	654,320	700,620
Fuel oil made (barrels)	198,000	267,000	286,000	347,000
Per cent	70%	65%	70%	70%
Gasoline made (barrels)	45,200	83,700	87,300	110,200
Per cent	16%	20%	21%	22%

*From data of Bureau of Mines—1922 is as of January 1, 1922—1924 is as of November 1, 1924—1925 is as of May 1, 1925.



Graph 1—California production of crude oil, crude run to stills and output of fuel oil and gasoline by months, for 1923, 1924 and 10 months of 1925.

other is usually warped by an ambitious imagination.

Based on what happened in 1924 and 1925, refinery runs of 500,000 bbls. of crude a day will mean 350,000 bbls. a day of fuel oil and 110,000 bbls. a day of refinery gasoline—to say nothing of natural gasoline of which California makes an abundance.

The danger to the price structure in California, directly—and to the rest of the United States, indirectly—lies more along the line of refined products than of crude oil. Rapidly decreasing quantities of crude oil are leaving California, but increasing quantities of refined products are clamoring for a market, first in the United States—and then in foreign lands.

With over 700,000 bbls. of refining capacity—over 600,000 bbls. of daily production—500,000 bbls. a day of refinery runs—and 100,000,000 bbls. of crude in storage, the problem quickly becomes one of continuing to "carry" the industry until either the supply slowly wears down to the demand—or the demand slowly works up to the supply.

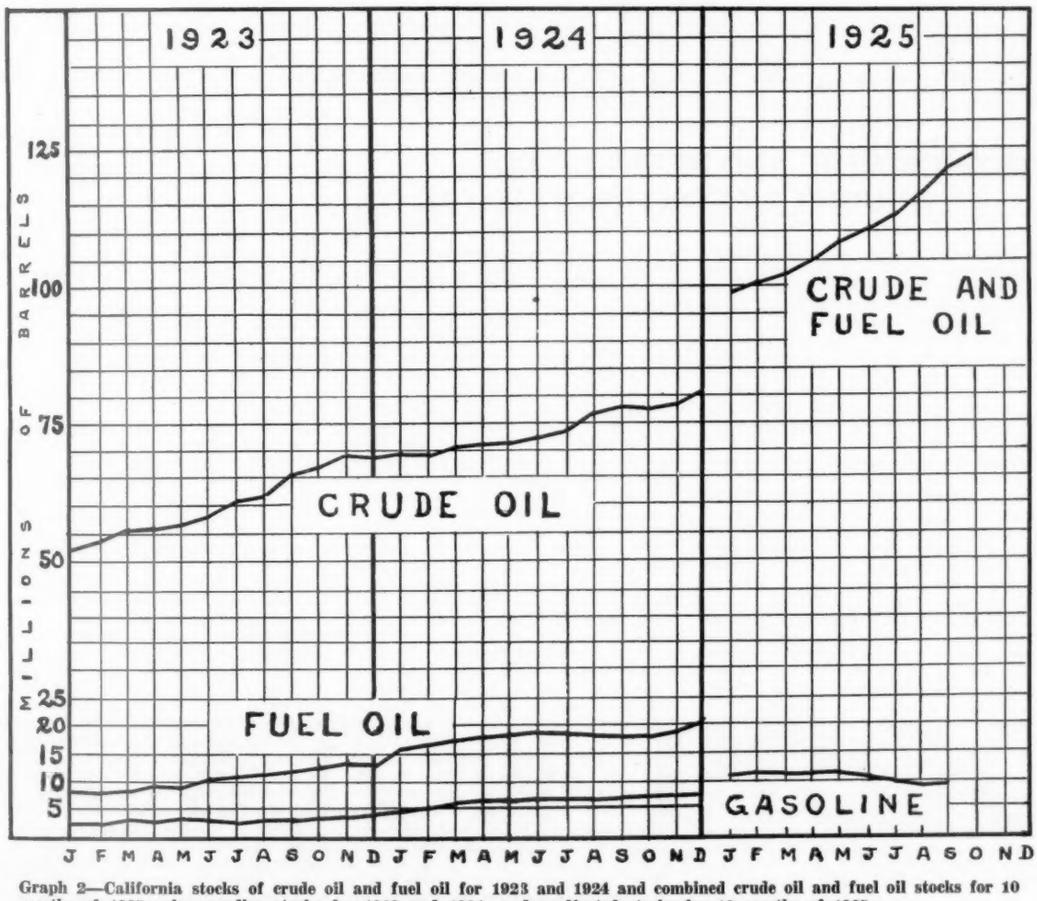
In 1920, 1921 and 1922 California was running along quietly while the Mid-Continent was suffering bitterly from the flood of Mexican oil pouring into the Atlantic Coast and Gulf Coast refineries. In 1923, 1924 and 1925 California oil to the Atlantic Seaboard "backed up" that part of the Mid-Continent surplus that had formerly gone there for its largest markets—and forced the Mid-Continent and Gulf Coast refineries and pipe line companies to meet the new situation—and at the same time absorb the surplus from four major Mid-Continent fields that reached their peaks in 1923.

But reducing refinery runs without reducing crude production simply means that more crude and less refined will go into storage. Crude stocks will not be reduced as long as daily production is greater than refinery runs, plus crude used as crude. And refined stocks will not be reduced as long as more products are made than the market absorbs.

Crude oil in storage in the United States today runs something over 400,000,000 bbls.—refined products (including refined fuel oil in California) runs something over 145,000,000 bbls.—a grand total of approximately 545,000,000 bbls.

In every industry, when stocks of raw materials and finished products get so heavy that price structures break, the producers of raw materials and the manufacturers of finished products suffer a real loss. But isn't it a largely preventable loss?

At the beginning of 1926, with the heaviest stocks in the industry's history—and with current production of both crude and refined at a rate well over a mark that would mean a healthy reduction of stocks during the next few months, it would seem that California, with three "hard years," and the Mid-Continent with five "lean years," would do everything possible to keep the present heavy burden of crude and refined from getting heavier.



Graph 2—California stocks of crude oil and fuel oil for 1923 and 1924 and combined crude oil and fuel oil stocks for 10 months of 1925—also gasoline stocks for 1923 and 1924, and readjusted stocks for 10 months of 1925.

Barnsdall Corp. Acquires Waite Phillips Co.

Edwin B. Reeser Elected President of Both Concerns. Authorize Increase in Stock

The first step in the acquisition of the Waite Phillips Co., purchased recently by Blair & Co., New York bankers, by the Barnsdall Corp. was taken on Tuesday of this week when stockholders of the Barnsdall Corp. met and elected Edwin B. Reeser, president of the Barnsdall Refining Co., as president of the corporation and also selected him to be president of the Waite Phillips Co. Robert Law, Jr., president of the Barnsdall Corp., resigned after disposing of his interests to Blair & Co. R. F. MacArthur, vice president and general manager of the Barnsdall Oil Co., was elected vice president of the Waite Phillips Co. to take charge of operations and fill the position left vacant by the resignation of R. B. Pringle, former vice president of the Waite Phillips Co. M. M. Doan, who has had charge of the operations of the Waite Phillips Co. since Mr. Pringle resigned, has retired from the directorate of the company, being reluctant to assume the multiplicity of duties in connection with his other interests.

The stockholders of the Barnsdall Corp. on Tuesday also authorized the increase of the capital stock to 1,000,000 shares of Class "A" and 3,000,000 shares of Class "B," both of which have a par value of $25 per share.

The Barnsdall Corp. has two grades of stock, "A" and "B." The "A" stock has an authorized issue of $20,000,000 with $8,428,000 outstanding, and the "B" stock $10,000,000 authorized with $3,713,000 outstanding. Barnsdall has $3,733,500 worth of bonds outstanding. These bonds are convertible to "B" stock at $40 a share. It also has a funded debt of $565,000. For the first nine months of 1925 the net earnings of the company were $2,158,996. The California properties of the Barnsdall Corp. are counted among its most choice possessions. Recently a deal was made between the Barnsdall and the Union Oil Co. whereby the latter company agreed to develop the properties of the Barnsdall Corp. with a minimum cost to Barnsdall. The Union took a half interest in the properties and paid a substantial price. The California properties of the Barnsdall Co. are to have splendid prospects.

The Waite Phillips Co. was started in Tulsa in 1921 and was originally a producing company. It has gradually expanded until today it possesses a complete system for the producing, transporting, refining and marketing of petroleum and its products.

200,000 Acres of Leases

Although the Waite Phillips Co. owns slightly better than 200,000 acres of nonproducing leases, these leases have been purchased carefully and conservatively and through the activities of a well organized land department, they represent an investment as judiciously expended as any company in the field.

The Waite Phillips Co. operates 67 bulk stations and 86 filling stations. It has a refinery at Okmulgee with a daily capacity of 6,000 bbls. It also has a refinery at Wichita, Kansas, which has a daily capacity of 5,000 bbls. Its crude oil storage is approximately 200,000 bbls. with available storage room for 200,000 bbls. additional.

Edwin B. Reeser

A list of the Waite Phillips acreage follows:

State	Producing Acres	Non-prod. Acres	Total Acres
Kansas	1,642	63,248	64,890
Oklahoma	4,509	72,599	77,108
Texas	1,000	65,859	66,859
Total	7,151	201,706	208,857

At the time of the sale of the Waite Phillips Co. to Blair & Co. the former concern had a daily production of about 10,000 bbls. Since that time this figure has decreased to 6,800 bbls., which is approximately the company's daily production at present.

The Barnsdall Corp. has a daily oil production of 15,000 bbls. out of which about 9,000 bbls. daily is in the Rosecrans Field in California.

NEW YORK, Jan. 12.—Blair & Co. issued an official statement that the consolidated Barnsdall-Waite Phillips Co. will have assets of $70,000,000. Matthew C. Brush was elected chairman of the board of the enlarged Barnsdall Corp. E. B. Reeser will be president and in charge of operations. E. R. Tinker, of the Chase Securities Corp., and Elisha Walker, of Blair & Co., will become directors.

In connection with acquisition of Waite Phillips, the Barnsdall Corp. has issued $25,000,000 15-year 6 per cent debenture bonds which are offered for public subscription at $100 and accrued interest by Blair & Co. New debentures will bear detachable warrants entitling holders to purchase 20 shares of class B stock of Barnsdall Corp. at $25 per share for

(Continued on Page 230)

California As a Market Stabilizer

Big Eastern Crude Buyers Fear Its Influence in the Event of a Rise in Crude Prices East of the Divide Early in the Year

By James McIntyre

With California producing 31.5 per cent of all the crude oil being produced in the United States at the commencement of 1926, there is no doubt that it will continue to be an important element in the petroleum situation for at least another six months. Its position with relation to the rest of the country is practically no different at the opening of this year than it was at the opening of last year. In the first week in January, 1925, California was producing 32 per cent of all the oil being brought to the surface in the country. There is only one-half of 1 per cent difference in this relationship now. There was a time in the course of the past year when new production in some of the Mid-Continent States became so great that California's proportion was reduced to 27 per cent of the total, but the decline of the Mid-Continent fields and the remarkable staying qualities of the California fields brought the Pacific Coastal State back to the position it occupied at the first of the year.

The influence of California on the general oil situation should not be discounted. Previous to the shipment of the first tanker load of California oil through the Panama Canal to the Atlantic Coast, California was a "local situation." It produced no more than was needed to provide oil products to consumers west of the Rocky Mountains and in Asiatic and Pacific island markets. Few eastern or Mid-Continent operators knew much about California oil fields geologically or otherwise and bothered themselves little as to how much oil California produced. It had its own market and easterners made no serious attempts to compete with it; but that was before the discovery in California of three of the biggest fields the world had known, which changed the status of California completely. When California oil men entered in competition with the eastern fields in the general oil markets by making the first shipment of crude through the Panama Canal to the Atlantic Coast eastern oil men at once began to give California serious consideration, and a reshaping of policies to meet a new and altogether unlooked for industrial condition was soon begun. Ever since that epochal day in 1923 when the first shipload of California oil reached the east, California has been a disturbing factor to the rest of the American oil industry, both crude and refined. At the beginning of 1924 it was generally considered possible that another year must pass before a change could be looked for, but the year closed with California in the same position it had occupied for a year and a half and with another year ahead in which its influence must be reckoned with. That year has gone by and still we have California as the most important element in the marketing and crude price situation, and not only that, but still showing its influence on operating activities of oil men and oil companies east of the Rocky Mountain Divide.

At the beginning of 1923 with the eastern oil market ranging from $1.75 to $3.25 per barrel and with the Mid-Continent market ranging from 90 cents to $1.80 per barrel there were 435 more field operations started east of California than at the beginning of 1926 with the eastern market ranging from $1.95 to $3.65 per barrel and the Mid-Continent market $1.15 to $2.43 per barrel. With every market inducement to encourage more drilling now, operators east of the divide hesitate to start new work because of the shadow of California hovering over them.

The movement of California crude to eastern ports in 1925 was little more than one-third the volume moved eastward in 1924. It amounted to approximately 14,000,000 bbls., or an average of about 38,000 bbls. a day. This quantity of crude does not seem sufficiently large to be important, but it must be remembered that California is producing about 200,000 bb's. a day more than its local marketing needs and that it has been storing oil and gasoline monthly. The enormous production of cheap Smackover crude, which, regardless of its low gravity and its sulphur content, was found available for the manufacture of a large volume of gasoline perhaps did much to stay the movement of California oils eastward in the past year. Smackover has long since passed its peak and is on the decline, and notwithstanding its production in 1925 of approximately 63,884,000 bbls. all but perhaps 7,000,000 bbls. of it was marketed. Its position in 1926 will be less important.

The California situation at the opening of 1926 has some different angles than at this time last year. The Inglewood Field had just appeared in the picture and had to be considered. Big things were expected of it and, in fact, it did produce 18,000,000 bbls. or thereabouts in the course of the year. Toward the close of the year another field appeared—the Long Beach extension. At the commencement of 1926 the Inglewood Field is declining and the Long Beach extension is already discounted with the possibility that many of its 100-odd drilling wells will never be finished and that its new production may do little better than to increase its production to 115,000 bbls., which is not much more than it was producing in the first week of the year.

With the Long Beach extension discounted there is little, if anything, in sight in California that promises to maintain production, and eastern observers on the ground in estimating production in California this year do not disagree materially with the estimates made by W. E. Dunlap, chief geologist and production manager of the United Oil Co. of California, published in The Oil and Gas Journal of December 17. Some of the easterns believe Mr. Dunlap's estimates are sound, though one capable representative of an eastern company who has been studying the California situation at close hand for the past couple of years is inclined to think that Dunlap is too conservative and that California will average no less than 600,000 bbls. a day in 1926.

Most of the eastern observers can see no important new fields in sight, but they all have a very great respect for the staying qualities of the producing sands in California, and are agreed that there is enough "sure-shot stuff" in the State that can be developed to give California all the oil it needs for some time to come, in addition to the fact that the Dominguez Field has a thickness of about 1,500 feet of oil zone which has not been penetrated more than 400 feet in that part of it where oil is deposited, the thickness of this sand series having been made known in drilling a dry hole on the edge of the field.

Stocks Not Alarming

The quantity of light oil in storage in California is not sufficient to be alarming. It amounts to only about 45,000,000 bbls., which is about the quantity owned by the Sinclair Crude Oil Purchasing Co.; about 9,000,000 bb's. more than the stocks of the Prairie Oil & Gas Co. and not much, if any, more than the stocks of the producing companies of the Standard Oil Co. of New Jersey. The most significant thing about California stocks is that they are becoming a burden to the companies owning them, as the storage is steadily filling and they are averse to erecting new tanks which can have only a temporary usage.

Gasoline Stocks Seek Outlet

California's influence on the industry generally, then, cannot be in the quantity of crude the State is producing, or the quantity of oil it is at present shipping to the East Coast, or the danger that it will again overproduce. Its influence at present lies mainly in the fact that it has a tremendous quantity of gasoline in storage for which it would like to find a profitable market and that it is in a position as regards crude to increase its shipments when demand is made. Particularly is it formidable from the standpoint of its gasoline now in storage. Therefore its influence lies mainly in the fact that it is stabilizing the crude market in all other fields.

Producers' Viewpoint

Mid-Continent oil men generally have been looking for an advance in the price of crude some time in January. They see production declining with no important fields in sight and with a few independent refiners in Oklahoma beginning to offer premiums in some fields. They see ahead a generally prosperous year in business and a continued increase in the consumption of oil products, all of which combined, in their opinion, makes for a higher price for crude oil.

How Buyers See It

On the other hand, the large crude purchasing companies cannot keep their eyes off California. They cannot see that the industry is yet out of the woods and fear that an advance in crude too early would precipitate a flood of California oil and gasoline, especially the latter, much in excess of what is now being sent through the Panama Canal, and sufficient to depress the market for the more eastern oils. A too early rise in the crude market, it is argued, would result in an early revival of wildcatting operations which might be at their height when it would be found necessary to reduce the price to meet California's increased competition, which would leave the wildcatter suspended in the air with no more than a promise of the present price of crude for such oil as might be discovered.

If the market can be permitted to ride along until early in the spring when the big demand for gasoline begins, the remainder of the year should see the general oil situation in an improved state with the relationship of California and the rest of the country nearly, if not quite, approaching what it was previous to 1923. That is the way the largest eastern oil buyers view the situation. Summed up it is simply a caution against rocking the boat.

A goodly portion of the independent oil purchasers in the Mid-Continent are of the same opinion as the larger companies. All freely admit that the oil business will prosper this year if the situation is handled judiciously. Unlike the coal men, or the lumber men, or a bunch of farmers, they cannot get together around a table and make plans for a cooperative business campaign through the year. If they did they would have every radical politician in Washington barking at their heels, but taken singly, it is found that their mind runs, with few exceptions, toward a desire for a stabilization of crude price and adversely toward the payment of premiums early in the year.

TEXHOMA OIL AND REFINING CO. BOUGHT BY CONTINENTAL OIL CO.

Confirmation of a transaction which has been rumored for several weeks was given during the past week in an official announcement that a controlling interest in the Texhoma Oil & Refining Co. of Wichita Falls, Tex., had been sold to the Continental Oil Co. of Denver, Colo. Details of the sale were not announced except that the purchase had been made on a basis of $125 for a $100 share of the Texhoma stock. The authorized capitalization of the Texhoma Co. was $6,000,000 of which practically all was outstanding.

Due to the position occupied by the Texhoma company in the North Texas fields, the transaction takes its place among the most important consummated during the past few months, a period marked with notable sales and mergers among large units of the industry.

The Texhoma Oil & Refining Co., which started as a small producing company in 1916, is now one of the strongest of the independents in the Mid-Continent Field with a well balanced organization having production, refining and marketing facilities. Through the acquisition of these properties the Continental company further strengthens its position as one of the major Standard units of the industry. Its present position in marketing is especially noteworthy. In addition to the Texhoma stations in Texas the company's products through bulk and service stations are marketed in a territory which includes Washington and Oregon on the west coast, all of the Rocky Mountain area extending to the Mississippi River and Kansas, Oklahoma and Texas of the southwest. This territory is larger than that of any other of the Standard companies.

The bulk of the Texhoma stock is held by the officers and directors of the company. The company's expansion was largely financed through its profits so that the original stockholders will receive a large return from their initial investment. W. B. Hamilton, president, and the largest single stockholder, has been the head of the company's operations from its organization. Other officers are N. H. Martin, vice president in charge of refining and marketing; E. H. Eddleman, vice president; J. D. Bright, secretary, and C. W. Snider, treasurer. J. J. Perkins, Frank Kell and J. A. Kemp, widely known North Texas capitalists and large stockholders in the company, are directors in the company.

Growth of Texhoma

After securing considerable production in the Burkburnett area, the company in 1919 purchased a refinery at Wichita Falls, which now has a capacity of 7,000 bbls. daily. The refinery has Dubbs cracking units with a rated capacity of 2,000 bbls. daily. Since 1919 the expansion of the company's properties has been rapid. Due to the several pools which it opened with discovery wells the company early acquired the title of the "Lucky Texhoma."

Most of its production, which totals approximately 5,000 bbls. daily, is in the

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(Quantity
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In the seven years since the foundation of the Institute it has so functioned as to grow in the confidence of the industry. The broad representation upon which it was organized has been widened to take in every branch of the business. The early fears that it might be dominated by any interest have been dispelled by the evidence of experience.

Within recent years there has been an increasing reliance upon the Institute to speak for the industry as a whole when occasion has demanded. And it is gratifying that it has not disappointed that expectation.

In the La Follette investigation Secretary R. L. Welch and members of the Institute rendered the industry invaluable service in presenting its case and refuting the slanders of its enemies.

In the campaign for carrying the industry's story to the public, launched by The Oil Industry's Answer, and taken up by the Western Petroleum Refiners Association, the Association of Natural Gasoline Manufacturers and other prominent oil organizations, the Institute assumed charge of the movement in its appointment of a Committee on Public Relations at the Fort Worth convention. It is expected that this committee will have a definite program to report at the Los Angeles meeting.

During the past year the Institute has been called upon to represent the industry in the most important inquiry into petroleum ever undertaken by the Government.

The reply of its Committee of Eleven on American Petroleum Supply and Demand, despite some difference of opinion from a minority holding an opposing theory, has been taken as most closely approximating the general views of the industry on the questions of conservation raised by the President's Conservation Board.

When the public hearings announced by Chairman Work are opened at Washington next month the industry will look to the Institute to represent it and in this connection the coming session in California will afford opportunity for conference.

Aside from affording an authoritative voice for the industry in dealing with the Government and the public, the Institute has established its usefulness to the industry itself by offering a forum for the discussion of practical problems in which all oil men are interested.

The program for the Los Angeles meeting covers a wide range of interest, as broad as the operations of the industry. The value of these annual meetings lies in the fact that they are devoted strictly to practical issues of immediate importance. There is no room for mere oratory. The members come together as business men to discuss in a business way the questions that have arisen during the year or that lie ahead.

Much of the work at Los Angeles will be accomplished in meetings of committees that have been studying their subjects for the past twelve months. Not least in importance will be the reports on fire prevention, of vital interest to all divisions of the industry, and on uniform accounting, which, when realized, will make so much for greater efficiency all around.

What the committees on standardization have accomplished is familiar to those directly interested but the work, naturally, is tedious and agreement only obtainable after prolonged consideration and exchange of views. No one doubts the need for this work and the enormous benefit its completion will bring about.

The group meetings, as usual, will be the center of interest, dealing as they do with the problems of each division debated by experts in each line. The papers to be read dealing with improvement of oil drilling and production methods and motor fuel and motor lubrication, and also with natural gasoline, will develop the very latest thought and will be heard and read with keen interest throughout the industry.

The California production and engineering symposium, arranged as a joint session between the standardization division of the Institute and the petroleum division and California sections of the American Institute of Mining and Metallurgical Engineers will be especially attractive because it will consider advanced problems that are at present engaging the thoughtful attention of oil men everywhere.

The discussion of oil as fuel and of special products from petroleum will be enlightening as to possible enlargement of the market which is believed to be far from completed with the present uses.

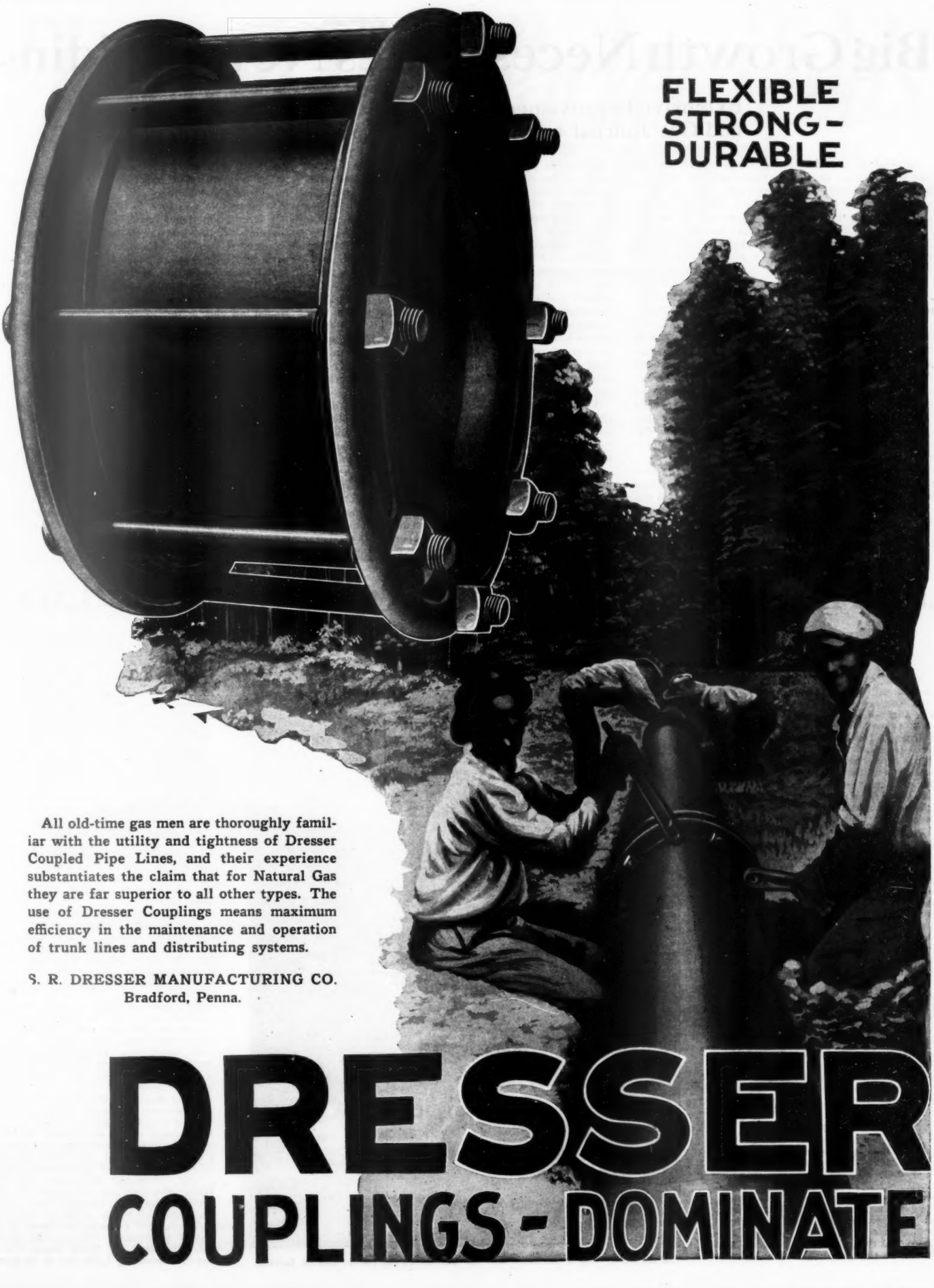
The constructive character of the program for the Los Angeles meeting further marks the evolution of the Institute as a practical and profitable institution. It will be recognized that most of the work in detail has fallen upon Secretary Welch, upon whom has devolved the responsibility of administration under the general direction of the board.

As in all great organizations representing a diversity of interests, the Institute has had to proceed with deliberation. It cannot anticipate the opinion of its members who can very materially assist it by greater promptness in expressing their views.

The Los Angeles meeting comes on the eve of the hearings at Washington by the Federal Oil Conservation Board. However conclusive the report of the Committee of Eleven may appear, there is always the possibility of congressional agitation arising out of the Conservation Board's inquiry and it behooves the members of the Institute to give this their gravest consideration.

With the prospect of higher prices for petroleum products we may look for a resumption of popular agitation fostered by aspiring politicians. The Institute's Committee on Public Relations should be prepared to meet or even forestall that agitation.

The position the Institute has attained within the industry has won it the confidence of oil men and qualified it to speak with authority on petroleum questions to the public. The promptness with which it took up and prepared its report to the Conservation Board encourages the expectation that it will be found equally alert when occasion arises.



All old-time gas men are thoroughly familiar with the utility and tightness of Dresser Coupled Pipe Lines, and their experience substantiates the claim that for Natural Gas they are far superior to all other types. The use of Dresser Couplings means maximum efficiency in the maintenance and operation of trunk lines and distributing systems.

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DRESSER
COUPLINGS - DOMINATE

Big Growth Necessitates New Building

Extensive Improvements Made in the Plant of The Oil and Gas Journal to Care for Its Rapid Expansion

In order to care for the rapid growth of The Oil and Gas Journal, the publication's building in Tulsa has been enlarged and 5,000 square feet of floor space added by the erection of an extension to the main building, permitting an expansion of the facilities of the various departments and making the plant the largest and most modern devoted exclusively to the publication of an oil trade periodical in the world.

The phenomenal expansion of The Oil and Gas Journal during recent years necessitated the construction of the addition to its building in Tulsa, the publication having more than doubled in size during the past four years as well as increasing its circulation to twice what it was four years ago. At that time The Oil and Gas Journal averaged from 80 to 96 pages each week while the average size at present is more than 160 pages, the issue this week containing 254 pages, exclusive of the four cover pages while the first Exposition number on October 1 last contained 366 pages besides the covers, all being made up and printed in the Journal's own plant.

Engineers who supervised the improvements just completed in The Oil and Gas Journal building worked out a system whereby the getting out of the "Big Yellow Book" is started in the front of the building and carried on through the various departments until the finished product is loaded on mail trucks from the big new mailing room in the rear of the building. When it is considered the average issue of The Oil and Gas Journal weighs more than one pound, the advantages of this system which reduces handling to a minimum are easily appreciated.

The improvements just completed include the remodeling of the original building of The Oil and Gas Journal, the erection of the addition in the rear of the main building which provides the 5,000 square feet extra floor space mentioned above, the installation of a sprinkling system throughout the entire structure, the placing in operation of a new steam heating plant which gives this form of heat in every department, doing away with gas formerly used and a rearrangement of the various departments which permits larger space and better working facilities.

The mailing departments has been segregated on the lower floor of the new building, the folders, cutters and stitchers being moved there while a concrete runway was built to permit the loading of the Journal at truck level at the side of this building. The removal from the pressroom of the machinery connected with the mailing department gives the pressroom the space needed for the expansion of press capacity and for the storage of paper. When it is considered The Oil and Gas Journal used 83,768 pounds of paper in December, exclusive of inserts, for the publishing of the Journal, the quantity of paper which must be kept on hand may be visualized.

Commodious quarters have been constructed for the circulation department on the second floor of the new building and the editorial rooms have been enlarged to care for the increased force made necessary by the growth of the publication. The editorial rooms now are larger and better equipped than those of most daily newspapers but it must be considered that while The Oil and Gas Journal is issued but once a week, forms are made up and published for an average of about 30 pages every working day. For the special issues, of which there have been a large number in recent years, more pages are printed every day than for most daily newspapers in the country. For instance, in the publishing of this week's issue, an average of 47 pages had to be made up and printed each working day during the week.

In addition to the big increase in the size of The Oil and Gas Journal during the past four years, the printing of the publication has been improved also. Four years ago no color was printed except black but now advertisements of two, three and four colors are carried in the usual run of business with the printing on a par with that of the largest publications in the world, irrespective of the field covered.

Journal A. P. I. Specials Are Trains De Luxe

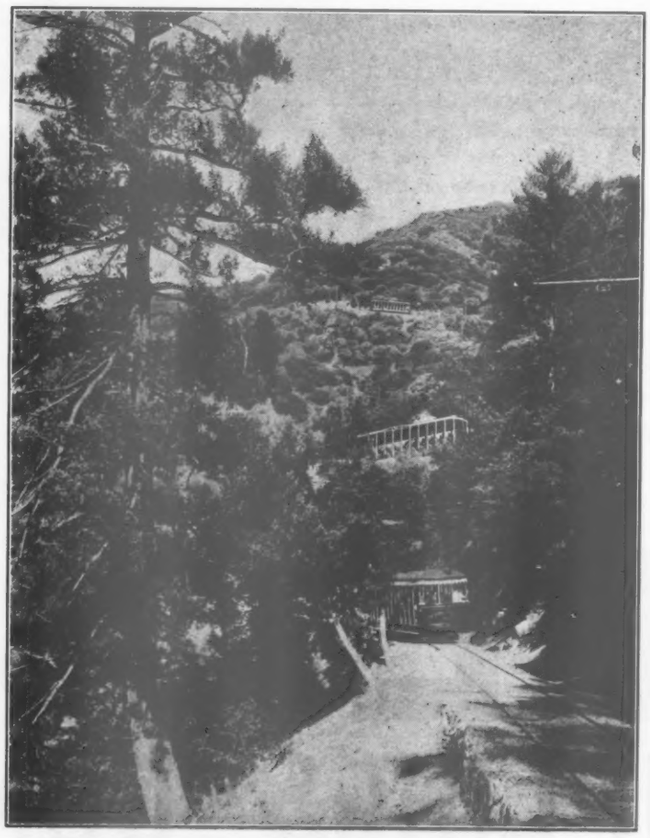
Long Trip to Los Angeles to Be Broken By Diversified Entertainment At Albuquerque and Grand Canyon

Two of the finest trains ever assembled in railroad annals will leave Newton, Kansas, at 2:45 p. m. Friday as The Oil and Gas Journal specials to the sixth annual convention of the American Petroleum Institute in Los Angeles. Oil men from all sections of the United States with their wives and other members of their families, together with leaders of industries closely associated with the business of producing, refining and transporting petroleum, will form the passenger list of these trains de luxe.

In the matter of equipment and service of the two trains, in the entertainment arranged en route, and in the light of the opportunity offered for those connected with the oil industry to become better acquainted in a social way during the long transcontinental journey, the trip will be one of the most pleasant, unique and profitable ever arranged in the industry. While the specials will start officially from Newton, special cars will start the run to Los Angeles from a number of principal cities throughout the country, those having reservations getting on these cars in their home cities and not being compelled to change at Newton, retaining the same accommodations throughout the trip. For instance, six of the special Pullmans will be attached to the Santa Fe train leaving Tulsa at 11:05 o'clock Thursday night, to care for those making reservations in that city and area. These Pullmans will form part of the special trains which will be made up at Newton.

Entertainment en Route

Arrangements made by The Oil and Gas Journal for entertainment en route will eliminate the unpleasant features of such a long train trip. By the time everyone has had an opportunity to get acquainted after the start from Newton, the best chefs in the Fred Harvey service will have dinner ready to serve. At 10:30 o'clock the next morning, the trains will reach Albuquerque, New Mexico. That city has prepared a big celebration in honor of those on The Oil and Gas Journal specials, and during the six-hour stop which will be made in Albuquerque there will be a big rodeo with famous riders from throughout the West taking part, Indian ceremonial dances given by members of different tribes from that part of New Mexico, and automobile rides around the city.



On the trolley trail to Mt. Lowe, near Los Angeles, on the Pacific Electric Railway.

All of Sunday will be spent at the Grand Canyon, the world's greatest scenic wonder. The special trains will reach Grand Canyon at 7:20 a. m. and leave there at 6 p. m. The length of the stop at Grand Canyon will permit all aboard the trains to make the trip down into the canyon and explore its beauties to their heart's content. At 1 p. m. Monday, the specials will pull into Los Angeles.

Consequently, there is not a long period of idleness on the trip and no chance for the railroad journey to become tedious or tiresome. Each day is broken up with splendid entertainment and each day's journey will be like a new trip with constantly changing scenes and diversified entertainment.

For those desiring to reach Los Angeles Sunday night in order to attend committee meetings early Monday, arrangements have been made to send a train direct from Albuquerque, eliminating the stop at Grand Canyon. This train will reach Los Angeles at 7 o'clock Sunday evening.

From Newton, the special trains will pass through the famous wheat and agricultural section of Kansas, going through Hutchinson, where are located the largest salt mines in the country, and Garden City, the center of the sugar beet industry. La Junta will be reached at 10:40 p. m. Friday and passengers from the Rocky Mountain area will board the specials during the 15-minute stop. From La Junta the trains travel to Trinidad, Colorado, the gateway to Raton Pass and 2 miles from Trinidad the trains start the climb up North Raton Creek, the line ascending 1,636 feet in 15 miles.

Flowing Thru Packer Holds Up the GRAVITY!

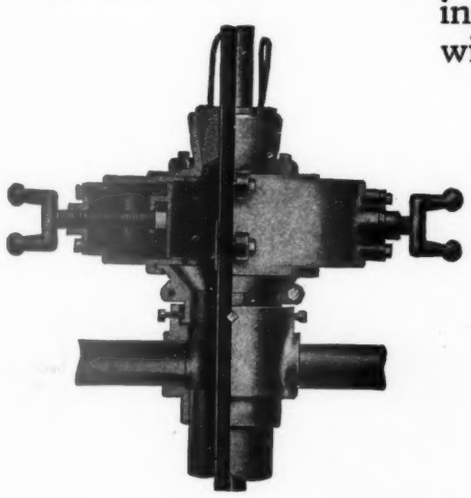
Allowing wells to flow through the casing, with the resulting escape of gas, carries a two-fold penalty:

1. It releases pressure that might be made to lift oil.
2. It rapidly diminishes the surface pressure that *holds up the gravity* of your oil.

Flowing through tubing holds this surface pressure and maintains the gravity, to the last possible moment.

Shrewd operators today consider the advisability of packing every well brought in, and in a rapidly increasing percentage of cases the decision is to PACK.

The most highly perfected equipment offered today for packing *flowing* wells is illustrated on this page. The GUIBERSON Tubing Oil Saver permits tubing to run in without loss of gas or oil. The GUIBERSON Control Head Packer can be run into wells against heavy flow, as, until set, it offers a roomy passage for oil and gas between p a c k e r and tubing. After being set it can be opened and closed at will. Investigate these patented devices.



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BETTER BE SAFE THAN SORRY

Mid-Continent Refinery Runs Increase

After Reductions for Two Months Operations on January 1 Were Higher Than December 1. Greater Than Year Ago

By Neil Williams

Crude runs to stills of Mid-Continent refineries were 15,225 bbls. greater January 1 than on the corresponding day of the previous month. This represented an increase of slightly more than 4 per cent. Total throughput on the first day of this year was 391,200 bbls.

These figures are based on the monthly survey of Mid-Continent refinery operations made by The Oil and Gas Journal showing runs to stills on the first day of each month taking into consideration the estimated daily average for the first 15 days.

The gain marked a turning point in refinery operations. The two previous reports, based on operations of December 1 and November 1, had shown decreases totaling 39,600 bbls., which brought the total throughput to within 3,440 bbls. of equaling the low mark of the year on January 1, 1925.

On that date, which was a year ago, crude runs to stills totaled only 372,535 bbls. In other words, the increase the first of this month was 18,665 bbls above the low of 1925.

The increase may have been partly responsible for the soft tone to the Oklahoma refined market at the opening of the new year, although a holiday lull in trading augmented the situation. However, since the first of the year prices have picked up some despite the increase in runs, but market observers describe the present market situation as being uncertain.

As during the previous month, refinery operations during December were in direct contrast to those of the same month of the previous year. During December, 1925, crude runs were decreased 10,675 bbls. daily. The condition at that time was reflected in fairly steady refined markets which resulted in sharp advances in prices during January and February.

Market students attribute the increase in runs to the strong market conditions during November and the first half of December. In that time prices of U. S. Motor gasoline advanced from 8½ to 10½ cents. This is believed to have encouraged Mid-Continent refiners to boost their runs the latter part of December and keep them up over January 1.

Not Localized

That the advance in runs was not localized was indicated in the fact that each of the five states, Oklahoma, North Central Texas, Kansas, North Louisiana and Arkansas, showed an increase in refinery throughput on January 1. However, if it were not for a few large jumps in runs by individual refineries, the total figures might have told a different story as there were more plants showing decreases than there were increases in runs. On the other hand, with few exceptions, the reductions in runs were comparatively small.

The increase in crude runs by refineries together with a decrease in production, has been reflected in a stronger crude situation on January 1 than on December 1. On the latter date Mid-Continent refiners ran only 34.7 per cent of the total crude production of that area, while on January 1 they took 38.3 per cent, an increase of 3.6 per cent. Considering only light crude production, Mid-Continent refiners ran 45.3 per cent of the production on January 1 as against only 41.2 per cent on the same date the previous month. These figures would indicate that there was considerably less Mid-Continent crude for the major outside buyers January 1 than on December 1.

Oklahoma

As can be seen in the accompanying summary table of operations Oklahoma refiners led the list, showing the greatest increase in runs with a gain of 6,250 bbls.; Kansas refiners increased runs 4,200 bbls.; Arkansas, 2,525 bbls.; North Central Texas, 1,550 bbls., and North Louisiana, 700 bbls.

Oklahoma's gain in crude runs was traceable almost entirely to a boost of 9,000 bbls. daily in operations at the Marland Refining Co. plant at Ponca City. That refinery reduced its runs in the late fall, but January 1 had restored its daily average throughput to 21,000 bbls.

Among the new plants listed shutdown on January 1 were the Oil State Refining Co. at Enid. This plant had been running approximately 700 bbls. daily, but shut down temporarily the first of the year. It will resume operations by the middle of the month, officials of the company declared.

Two small plants were added to the list in Oklahoma this month, but these only added 100 bbls. each to the total figures. The plants, those of the Mecca Refining Co. at Allen and the Miller Brothers at 101 Ranch at Marland, were running some crude at the time previous reports were made, but were not included on the list until this time.

Not considering the Whaleback Production Co. at Oklahoma City, whose plant, being shut down longer than a year, has been removed from the list, Oklahoma had two more plants on the active list January 1 than on December 1. Of the 59 listed plants, 49 were reported operating while on December 1, 47 of the 58 plants were running.

North Texas

Among refining operations in North Central Texas were two plants, which had been shut down for some time, resuming operations, and three others shutting down. Those which resumed operations were the Primrose Refining Co. at Wichita Falls and the Star Refining & Producing Co. at Fort Worth. Plants which shut down during December were the Sweetwater Refining Co. at Sweetwater, the Petroleum Corp. at Electra and the Sunshine Consolidated Oil Co. at Wichita Falls.

Kansas

Except for a few plants making substantial increases in runs there were no material changes in refinery operations in Kansas. Four plants reported increases, while four others made reductions.

Louisiana-Arkansas

An increase of 500 bbls. in runs at the plant of the Great Southern Refining Co. at Ardis, and 200 bbls. at the Shreveport Producing & Refining Co. plant accounted for all the changes in operations of North Louisiana refineries during December. The Ardis plant has been running far below its rated capacity for a number of months so the increase on January 1 indicated only an effort to return the plant to normal operations.

Arkansas reports showed that four refineries increased runs while four others reduced them. Among the important changes were those of the Lion Oil & Refining Co., whose runs were reported 1,200 bbls. greater January 1 than on December 1. The Kettle Creek Refining Co. boosted runs 400 bbls. and the Root refinery 280 bbls.

Taking the Mid-Continent as a whole, there was no change in the total operating and shut down refineries despite the several changes in the various States. As shown in the accompanying summary table, there was a total of 147 plants, of which 118 were operating, on January 1, and on December 1 there were the same number.

MID-CONTINENT REFINERY OPERATIONS

Table No. 1

(Based on Plants January 1, 1926, and December 1, 1925)

	*No. Plts. Jan. 1	Capacity	Plts. Op. Jan. 1	Daily Runs Jan. 1	Plts. Op. Dec. 1	Daily Runs Dec. 1	Daily Increase Jan. 1
Oklahoma	59	273,100	49	170,130	47	163,880	6,250
North Central Texas	46	177,100	36	83,925	37	82,375	1,550
†Kansas	26	130,400	19	86,450	19	82,250	4,200
North Louisiana	6	37,500	6	30,700	6	30,000	700
Arkansas	10	30,000	9	19,995	9	17,470	2,525
Total	147	648,100	118	391,200	118	375,975	15,225

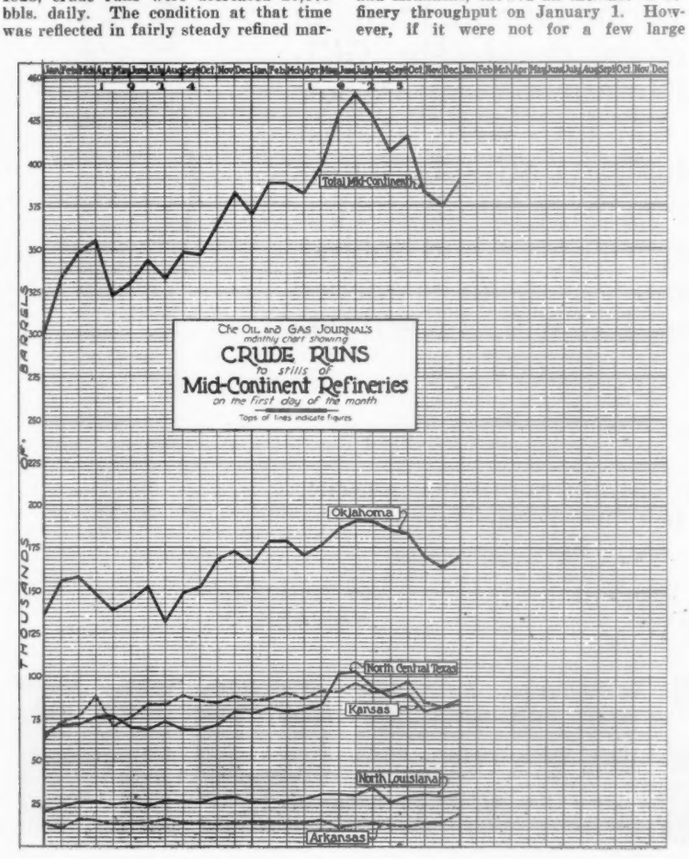
‡Does not include 110 plants which have been shut down one year or longer.
†Includes two Missouri plants.

Table No. 2

(Based on plants January 1, 1926, and January 1, 1925)

	*No. Plts. Jan. 1, '25	Capacity Jan. 1, '25	Plts. Op. Jan. 1, '25	Daily Runs Jan. 1, '25	Daily Decrease Jan. 1, '26
Oklahoma	58	260,200	48	167,115	3,715
North Central Texas	45	165,750	39	86,275	‡2,350
†Kansas	27	135,300	22	78,000	8,450
North Louisiana	8	37,300	6	26,600	4,100
Arkansas	15	36,950	8	14,545	5,450
Total	153	635,500	123	372,535	18,665

*Does not include 104 plants which have been shut down one year or longer.
†Includes three Missouri plants.
‡Decrease.



REFINING OPERATIONS IN OKLAHOMA

(Plants which have been in operation during the past year.)

Name and Location—	Daily Capacity	Runs Jan. 1	Runs Dec. 1
Anderson-Prichard, Cyril	1,200	750	800
Barnsdall Refining Co., Barnsdall	5,000	3,800	3,800
Bell Oil & Gas Co., Grandfield	3,000	1,200	1,200
Bolene Refining Co., Enid	5,000	3,000	2,700
Cameron Refining Co., Ardmore	3,900	3,100	3,100
Canfield Refining Co., Yale	500	150	150
Champlin Refining Co., Enid	16,000	8,000	9,000
Coleman-Nelson Corp., West Tulsa	2,000	Shut down	Shut down
Continental Oil Co., Sapulpa	7,000	1,500	1,500
Cushing Refining & Gasoline Co., Cushing	2,500	1,500	1,000
Cushing Refining & Gasoline Co., Blackwell	1,500	1,100	1,000
Daisy Bell Petroleum Co., Wilson	2,000	Shut down	Shut down
Empire Refineries, Inc., Cushing	7,000	5,000	5,000
Empire Refineries, Inc., Okmulgee	3,000	3,000	3,000
Empire Refineries, Inc., Ponca City	6,500	6,000	6,000
Fairmount Refining Co., Fairmount	2,500	1,800	1,800
Garber Refining Co. (Omar)	3,000	2,000	3,000
Gilmer Oil Co., Ringling	1,000	1,100	1,100
Globe Oil & Refining Co., Blackwell	5,000	4,500	4,500
Hewitt Refining Co., Hewitt	1,800	750	790
Illinois Oil Co., Cushing	3,000	1,400	1,600
Imperial Refining Co., Ardmore	6,000	4,850	3,350

(Continued on Page 169)

Cracked Gasoline Knoxless-Pullsmore

There might have been some excuse for the refiner who ignored the opportunity for greater profits and refused to install a Dubbs Cracking Process because he underestimated the quality of the gasoline it produced

But he hasn't the ghost of a reason now For cracked gasoline is today proven and acknowledged the superior motor fuel It is knockless, it pulls more It is worth a premium price over straight run

Today, more than ever before, the refiner who can but fails to install the Dubbs Cracking Process deserves the meager returns he gets

Universal Oil Products Company
Owners of the Dubbs Process
310 South Michigan Ave
Chicago, Illinois

Late News From the Fields

OKLAHOMA

Production of the wildcat well of Morgan & Flynn near Earlsboro in Section 10-9-5, Seminole County, Oklahoma, has been increased by deeper drilling. The sand from which it is producing has not been identified, but is recorded 3,660-71 feet and the well flowed 185 bbls. Tuesday of this week. The flow was assisted to some extent by agitation.

The Mid-Kansas Oil Co. is shut down at 3,600 feet with a hole full of water in No. 1 MacFarland, NW cor. NW SW, Section 27-8-9. The water was found in a sand thought to be the Papoose sand at 3,578-98 feet.

KANSAS

Two north end wells in the Russell Pool of central western Kansas are on the sand and two inside producers have been added to the rapidly growing list of producers there.

Derby Oil Co. and others' No. 5 Sutton, in the NE SW, Section 5-12-15, is on top of the Oswald pay and running pipe at 2,762 feet.

Snowden, McSweeney & McNutt are running the 6-inch to the top of the pay in their No. 1 Booth, in the SW SE, Section 32-11-15, an east offset to Derby Oil Co. and others' No. 1 Dodge, which extended the pool to the north. Top of the Dodge pay in Booth No. 1 was found at 2,775 feet.

Midwest Exploration Co.'s No. 1 Oswald, in the NE NW, Section 8-12-15, is making 275 bbls. from the Oswald lime at 2,964 feet, and its No. 6 Oswald, in the NW of Section 8-12-15, recently drilled in, is estimated at 300 bbls. a day from 2,935 feet.

Two outlying tests which have begun to attract attention are Midwest's No. 1 Austin in the NE SW of Section 30-12-15, 3 miles south of the pool, which is drilling at 2,720 feet, and Doctors' Syndicate No. 1 Link, in the SW SE of Section 19-11-15, a mile north of the pool, which is drilling at 2,650 feet.

GULF COAST

HOUSTON, Tex., Jan. 12. — The Orange Petroleum Co.'s No. 9 Chesson, in the center of the Orange Pool, is flowing 3,500 bbls. at 4,660 feet. It is an old hole deepened 8 feet. The Chesson tract has proven to be a very productive area in the Orange Pool, especially from the deep sands. Recently the Humble Oil & Refining Co. got two nice wells on the Chesson and others are now being drilled deeper by that company and the Continental Oil Co., which also has a part of the Chesson acreage under lease. K. Kishi, a wealthy Japanese rice grower, is the principal stockholder in the Orange Petroleum Co. He has been a pioneer in the development of the Orange Pool.

The Rycade Petroleum Corp.'s No. 5 Nash, off the new dome, 7 miles east of Damon Mound, is now flowing 600 bbls. into earthen pits. The well came in early last week at 4,146 feet. Another gravity test shows 20.5 Baume instead of 18 Baume, as previously reported. Steel tankage has been shipped to the well and the production will be stored for the present.

The Humble Oil & Refining Co.'s No. 1 Kleberg, southeast of Kingsville, Kleberg County, is a gas well at 2,100 feet. The company has one oil well there and two gassers now.

The Grayburg Oil Co. has a location for No. 1 on 100 acres north of the Humble Oil & Refining Co.'s recent deep sand well in the Piedras Pintas Pool, in Duval County. It is the first deep sand well around that saline dome.

The annual report of the Gulf Coast pools will show 1,145 wells completed during 1925, an increase of 181 over 1924. The new production of 371,243 bbls., a decrease of 68,917 bbls. Dry holes and salt water wells increased 46.

Gulf Production Co.'s No. 61 Phoenix, in the Hull Pool, is flowing 1,000 bbls. 3,475 feet.

NORTH CENTRAL TEXAS

FORT WORTH, Tex., Jan. 12.—An oil strike in the southern half of Jack County is attracting attention. The well is the Buttram Petroleum Co.'s No. 1 Preston, which got the sand at 2,007 feet and at 5 feet in is reported producing considerable oil. The well is said to have bailed at the rate of 55 bbls. daily from this sand. The Buttram discovery well is about 4 miles almost due west of the old Williams well of the Roxana Petroleum Corp., which came in four or five years ago. The Roxana well, however, is a deep producer, the oil coming from around 4,700 feet.

The Cross Plains townsite pool, in Callahan County, reports one new producer, not yet listed as a completion. Brannon and others' No. 1, Block 20, which is producing flush at the rate of 200 bbls. daily from sand at 1,446 to 1,449 feet.

Wilbarger County reports four new producers, two by the Humble Oil & Refining Co. in the South Vernon Pool, and two by the Landreth Production Co. in the Noble, or Landreth, Pool, to the southeast. The Humble Oil & Refining Co.'s No. 31 Stephens is swabbing 220 bbls. from the lime at 2,361 to 2,425 feet and is being cleaned out. The same company's No. 39 Stephens is swabbing oil from the sand at 2,331 to 2,380 feet. On a 12-hour test it made 110 bbls.

The Landreth Production Co.'s No. 9-D Waggoner is flowing at the rate of 240 bbls. daily from the sand at 1,903 to 1,918 feet and the No. 10-D Waggoner is flowing 110 bbls. from sand at 1,870 to 1,880 feet.

In Archer County, the Texhoma Oil & Refining Co.'s No. 5 Oldham is showing for a 100-bbl. well in sand at 1,363 feet and its No. 1 Wolf is making 210 bbls. daily from the sand at 1,313 to 1,339 feet.

The Trinity Townsite Co.'s No. 2 fee is a new producer in the 1,400-foot sand. It is estimated good for 200 bbls. at 1,404 to 1,409 feet.

Also in south Archer County, the Trio Production Co.'s No. 9 Brom is a new producer, making 120 bbls. daily from the sand at 1,380 to 1,410 feet.

A close watch is being kept on the Humble Oil & Refining Co.'s No. 3 Powell, in Crockett County, which is drilling in the lime at 2,577 feet and has the 6-inch casing landed at 2,572 feet.

Long Beach Extended Two Blocks Eastward With 1,500-Bbl. Well

LOS ANGELES, Calif., Jan. 11.—A. J. Delaney's No. 5 Cerritos in Long Beach Extension, came in flowing 1,500 bbls. daily from 4,354 feet and extended the field two blocks easterly.

This is the second largest well finished in the extension since it was opened and renders the problem of estimating future field production rather difficult as a majority of the completions have come in doing less than 500 bbls. a day.

HUMBLE TO DEVELOP TEXAS PACIFIC TRUST

The Texas Pacific Land Trust has completed negotiations under which the Humble Oil & Refining Co., controlled by Standard Oil of New Jersey, will develop 11 leases, covering 52,801 acres of land. The terms of the lease include a cash consideration of $35,560 and royalty of 12½ per cent of all oil produced.

Negotiations are understood to be under way for leasing additional areas of the 1,929,483 acres unsold at the close of 1925.

Income of Texas Pacific Land Trust for 1925 from mineral leases is estimated at $186,000, against $42,000 in 1924. Based on the 19,496 certificates outstanding, earnings for 1925 approximated $10 per certificate.

DAVID F. CONNOLLY MEMORIAL FUND NEEDS $4,500 TO FINISH PROJECT

Slightly more than $5,500 has been raised towards the $10,000 needed to install an X-ray department in St. John's Hospital, Tulsa, as a memorial to David F. Connolly, prominent oil man who dropped dead recently while making a speech at the dinner closing the building campaign of the hospital. Shortly before his death, Mr. Connolly had stated he would raise the $10,000 necessary to install the X-ray department from among his friends in the oil business. His sudden demise prevented Mr. Connolly from carrying out his desire but the Tulsa Daily World and The Oil and Gas Journal took up the movement to raise this fund as a fitting memorial to Mr. Connolly who was known from coast to coast and from Canada to Mexico.

It is believed the $4,500 needed to complete the fund will be raised within a very short time if oil men who knew Mr. Connolly will send in subscriptions to the fund at this time. Approximately 80 rooms of the hospital will be opened February 1 and it is desired to make provision for the X-ray department which will be known as the David F. Connolly memorial. The largest subscription to the fund so far was received from Waite Phillips who gave $2,000.

St. John's Hospital was one of Mr. Connolly's cherished projects and he worked hard during the recent building campaign to procure funds with which to complete the building. The success of that campaign was the culmination of several years of earnest endeavor in which Mr. Connolly took a leading part.

Proper acknowledgment will be made of all funds received for the memorial.

PAN AMERICAN GETS 45,000 MEXICAN WELL

By George Blardone

TAMPICO, Mex., Jan. 9.—Huasteca Petroleum Co. (Pan American Eastern), has finished two good wells in its Tierra Blanca, in the South Fields. Its No. 54 is finished at the shallow subsea level depth of 1,867 feet, good for say a potential head of 45,000 bbls. Its No. 57, same lease, is good for say a potential head rating of 15,000 bbls. at a subsea rating of 1,972 feet. Both wells were closed in pending the time they are cared for. Huasteca has other production closed in in its Tierra Blanca.

SHELBY COUNTY, TEXAS

Roy Anderson and N. D. Huie of Arkadelphia and El Dorado, Ark., are drilling below 500 feet on the W. J. Crane survey in Shelby County, Texas, on land owned by W. R. Pickering Lumber Co.

OIL SURVEY REPORTED BY CHAIRMAN WORK

WASHINGTON, D. C., Jan. 9.—Secretary Work, chairman of the President's Oil Board, has submitted to Secretary of Commerce Hoover, Secretary of War Davis and Secretary of the Navy Wilbur a complete survey of the oil industry of the United States—a survey made by the industry itself, touching all its vast ramifications, its past, present and future problems and policies.

An American industry that girdles the globe, that supplies more than 65 per cent of the world's petroleum supply, and whose potential money value runs into the billions, freely and frankly placed before the President's Oil Board its beliefs, the results of its experiences and its hopes for the industry's future. This was done in response to questionnaires addressed to the industry by the Government board, and the replies recently were collated and epitomized into one concrete report which the chairman of the board has just transmitted to his fellow board members.

After making a careful study of the material the oil board will announce dates for public hearings, possibly the latter part of the present month. As these hearings the board will listen to representative oil men who care to appear and present data and oral views relative to the country's petroleum conditions. A final report subsequently will be made to the President and the Congress in which the board will detail present and past conditions and submit recommendations for the future treatment of the Nation's oil resources.

The Advisory Committee of Government experts, appointed by the board to handle the technical details of the survey into oil conditions, completed after months of study a review of replies to 10 questionnaires addressed to the industry. These questionnaires asked information concerning production, refining, possible substitutes, foreign development, storage facilities, and waste in utilization, and to all of these inquiries the heads of the country's greatest companies and corporations replied, many in great detail. All the material thus submitted to the board was reduced to statements embracing the 10 separate and distinct phases upon which information was sought by the Government. This epitomized "picture, painted by the industry itself depicting its present problems and conditions" was submitted by the board's Advisory Committee consisting of Dr. George Otis Smith, director of Geological Survey, chairman; Brig. Gen. Edgar Jadwin, War Department; Rear Admiral Harry Harwood Rousseau, Navy Department, and Harry H. Hill, Bureau of Mines.

The board will proceed with a study of additional facts and material which relate to national and international petroleum conditions. This datum deals with certain inquiries conducted during the past year by other governmental bodies, reports made to the board by the Army, Navy and United States Shipping Board relative to their respective present and future requirements of petroleum products, reports by the Geological Survey and the Bureau of Mines, and the report made some months ago to the President by the Naval Oil Reserve Commission.

DIED AFTER OPERATION

Harry L. Hamilton

Former superintendent in the coastal region for the Hamilton Oil Corp., later the Oil Issues Corp., and previously superintendent of the Montebello Oil Co. of California, who died recently at the early age of 42 at San Antonio, Texas, following an operation.

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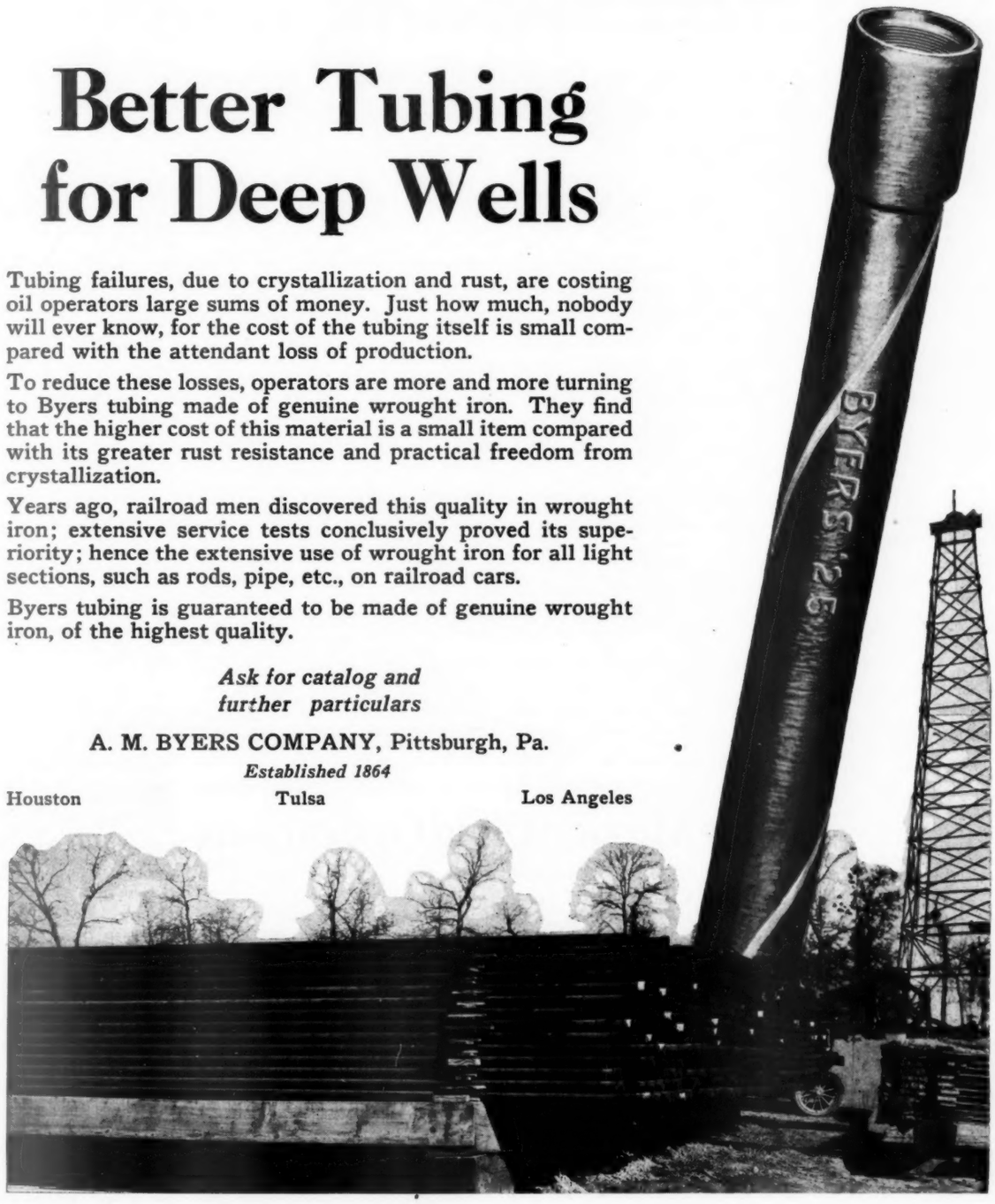

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Oklahoma Field Operations

By J. L. Dwyer

Area around Wewoka center of interest with Magnolia's deep well holding up around 4,000 bbls. daily. Indications are Fuhrman Pool dips strongly to south and southwest. Garber production continues decline. Few wells completed in Davenport area. Bartlesville sand well, old Cushing district, 700 bbls.

The Okmulgee district is in the limelight again with two spots vieing with each other to command the attention of the oil fraternity.

The territory around Wewoka with its recently completed Wilcox sand well is very closely observed, and the well (Magnolia Petroleum Co.'s No. 1, NW cor. NW, Section 5-7-8), is making 4,000 bbls. daily after almost a month of productive life. The well hardly varies 100 bbls. a day. The rising temperature of the oil seems to have no effect upon the anxiety of royalty buyers and although the thermometer registered 110 degrees on the oil, one individual last week paid over $2,000 an acre for royalty offsetting the well.

The deepest wells in the new operation at Wewoka are the Ramsey interests' No. 2, in the SE cor. SE, Section 31-8-8, which is on top of the sand and the Dixie Oil Co.'s well, NE cor. NE, Section 5-7-8. The Ramsey well is an offset to the Magnolia well and the Dixie well is 1 mile east of the well. Several wells are within 200 feet of the sand, but at that depth the drilling is slow.

One geologist who has made an intensive study of the region believes that the new pool will not cover more than 240 acres.

Fuhrman Pool

The Fuhrman Pool in Section 26-9-9, Hughes County, offers a greater opportunity for study. The most interesting development of this section during the past week was the revised sand record which was given out by the owners. The Independent Oil & Gas Co., who purchased a half interest in this operation shortly after the completion of the discovery well, caused a steel line to be run, and the sand which had originally been announced at 3,360-70 feet was changed to 3,385-3,400 feet. This change in depth of the pay strata makes considerable difference in the appearance of the field. The Independent Oil & Gas Co.'s well, SW cor. NE Section 26-9-9, a quarter-mile east and a location north of the discovery well is practically a dry hole. It has a production of possibly 50 bbls. a day. This well picked up some water, and it had the sand 3,388-3,437 feet. The Midland Oil Co.'s (Empire) No. 3 Proctor, SW cor. SE NW, Section 26-9-9, a diagonal offset to the discovery well, is making 15 bbls. an hour from sand 3,407-18 feet.

The present status of the Fuhrman Pool may be summarized as follows:

The northeast diagonal offset to the well is a light well; the well a quarter mile east is practically dry, and an examination of logs of wells drilling south and southwest of the pool reveals a strong dip in that direction; the discovery well is steadily producing 750 bbls. daily. These facts influence the opinion that the Fuhrman Pool is closely following the confformation of the majority of pools in this region, namely running northwest and southeast, and the leases to the west and northwest of the discovery well look very favorable at present. To the southeast there is ample room for development of production before any dry holes are encountered.

Garber Field

In the Garber Field the production decreased slightly last week and on Monday of this week deep sand production at Garber was 20,605 bbls. and the total production of the field was 26,180 bbls. The only well to be complete during the week was a Layton sand well, Roxana Petroleum Corp.'s No. 11 Schroeder, NW cor. SE SW, Section 18-22-3w, which is flowing 50 bbls. an hour from sand at 3,624-26 feet. It will probably be two weeks before any of the wells drilling to the Wilcox sand in this area will be complete. Garber seems to be in the setting sun of its production.

At Davenport, in Lincoln County, there were a few completion and a well which fails to encourage anyone with its showings. The Gypsy Oil Co.'s No. 3 Caves entered the ranks of producers when it flowed 10 bbls. an hour from sand at 3,320-95 feet. This is in the SE cor. SW SE, Section 35-15-5, and offsets wells of about equal production owned by the Carter Oil Co. Magnolia Petroleum Co.'s No. 1 Chapman, NW cor SW, Section 11-14-5, was drilled 5 feet deeper to a total depth of 3,403 feet and picked up some water and a hole full of oil. This well will be plugged back 2 or 3 feet. The Mid-Kansas Oil Co.'s No. 1, SW cor NW, Section 36-15-g, had the sand at 3,354-3,410 feet and is drilling in shale at 3,418 feet with a small show of oil and gas.

North of the Davenport Pool, the wildcat of Morgan & Flynn is drilling at 3,570 feet. This well is in the NW cor. SW, Section 25-15-5. At Davenport, The Texas Co.'s No. 1 Strough, NE cor. SE, Section 4-14-5, made 372 bbls. Sand record on this well is not available.

Southeast of Davenport, in Lincoln County, the Producers & Refiners Corp.'s No. 1 Hennzey, NW cor. SW, Section 14-13-6, had a show of gas at 4,156 feet.

Surprise in Cushing

A distinct surprise was offered from the old Cushing district when the Magnolia Petroleum Co.'s No. 30 Vance, CNL S half NW NE, Section 7-18-7, found the Bartlesville sand at 2,428-79 feet and flowed 700 bbls. the first day. There has been considerable activity around the old fields of this section, and this is the first unusual result of the work.

In Okfuskee County, the Mid-Kansas Oil Co.'s No. 1, NW cor. NE, Section 17-12-7, had a show for a 30-bbl. well in sand at 2,900-5 feet, but a hole full of water was found. The rig burned down and is being rebuilt.

In Kay County the Braman Townsite Pool came back into prominence for a brief moment when one of the Comar Oil Co. wells started flowing at a tremendous rate. The excitement was short lived for the well quickly settled down to a flow of 800 bbls. daily. It was the Comar Oil Co.'s No. 2 Biddle, CNL NE SW, Section 5-28-1w, and the regular Stalnaker sand was found at 2,294-2,307 feet and the hole had a total depth of 2,340 feet. The well started flowing at the rate of 90 bbls. an hour at a small depth in the sand, and the hopes of the owners were temporarily buoyed up. The well registered 885 bbls. for the first day.

In Wagoner County, the old Coweta district gave the operators a thrill when a well which had been plugged for several years came to life like a ghost out of a grave. The well was drilled about eight years ago by the Broken Arrow Oil & Gas Co. in the NE cor. NW NE, Section 6-17-15. It found some gas in a sand 1,320-31 feet and the well produced gas for several years. About 18 months ago it quit and the hole was plugged. The tubing could not be freed to pull, and so was left in the well. One morning last week the well was found shooting a thin stream of oil into the air, and for several days it has averaged 35 bbls. a day. The well flows better at night than in the daytime. Some geologists who have examined this phenomenon are of the opinion that tremors of the earth have affected the subsurface and caused the production, but others believe the old gas sand was close to a body of oil, and that the oil gradually migrated upwards, increasing the old gas pressure and cleaning the hole of the pluggings. The ocean tides are said by one geologist to be responsible for the increased flow of the well at night.

Pawnee County

In the Masham area, the Magnolia Petroleum Co. has built a rig for No. 1 School Land, SW cor. SW, Section 13-23-4. In southwestern Pawnee County, the Prairie Oil & Gas Co. is rigging up standard tools for No. 1, SW cor. SE, Section 10-20-5.

Watchorn Oil & Gas Co. is drilling at 950 feet in No. 13 Miller, C SW SW, Section 33-23-3, and the rig is being built for No. 14 Miller, NE cor. SW, Section 33-23-3.

Magnolia Petroleum Co. has a Wilcox sand well in No. 8, SE cor. SW NW, Section 4-22-3. Sand was 4,052-4,103 feet and the well made 225 bbls. natural. It is to be shot and is not completed.

The Pulaski Oil Co. is rigged up to drill an old well deeper in No. 9, C SW SE, Section 26-21-8. Dixie Oil Co. has 2,000,000 feet of gas in sand found at 2,953-97 feet in No. 1, NW cor. SE SW, Section 27-21-8. J. B. Grieves' No. 2, SW cor. SE NW, Section 31-21-8, had sand 2,608-14 feet and made 125 bbls. naturally. The rig is built for No. 2-A Haverkamp, SW cor NE SW, Section 31-21-8. Adamson and others' No. 5, CSL NW NW SW, Section 32-21-8, is estimated at 200 bbls. from sand 2,630-45 feet. Tidal Oil Co. has abandoned No. 2, CNL SW NE, Section 35-21-8, at 3,024 feet, and No. 7, NW cor. SE NE, Section 35-21-8, shot a sand 2,573-98 feet with 60 quarts and is estimated at 25 bbls. The well is being cleaned out to get the casing on bottom. Sun Ray Oil Co. has abandoned No. 1, SE cor. NW, Section 8-20-7, at 2,980 feet. Johnson and others' No. 3 Imhoff, NE cor. NW SE, Section 25-20-7, had the Wilcox sand 3,238-58 feet with water and is drilling ahead at 3,320 feet. Sinclair Oil & Gas Co. is rigging up to drill an old well deeper in No. 5 Brentenall, SW cor. NE, Section 10-20-8.

Kay County

In the Blackwell district, the Black Gold Oil Co. has built the rig for No. 2 Jones, NW cor. NW, Section 10-27-1w. West of the Tonkawa Field, the Carter Oil Co.'s No. 1, NE cor. SW, Section 30-25-1w, is drilling at 4,448 feet in black lime and making 150 bbls. of oil a day and two bailers of water an hour. It is not completed. Comar Oil Co.'s No. 8-W Gaume, SW cor. NE, Section 2-24-1w, in the Tonkawa Field, is rigging up; and No. 11 W. Carmichael, SE cor. NE NE, Section 3-24-1w, is rigging up to drill deeper.

In the Dilworth area, Strosnyder and others have a rig on the ground for No. 1 Smith, SW cor. NW NW, Section 25-29-1.

Grady County

Magnolia Petroleum Co. has rigged up a rotary for No. 4 Farwell, NE cor. SE SE, Section 23-5-8w. Westervelt & Noble have a gas well in No. 3, SE cor. SW, Section 26-5-8w. Broken sand was 2,130-2,425 feet and the well made 40,000,000 feet of gas. Skelly Oil Co. is drilling at 250 feet in No. 1, C SW SW, Section 35-5-8w.

The Carter Oil Co.'s No. 1, SE cor. SW SW, Section 5-3-5w, had sand 2,782-90 feet and broken sand 2,790-2,809 feet and made 75 bbls. on the pump. It is completed. Carter Oil Co. has a gas well in No. 2, CEL NW SW, Section 2-4-8w. Broken sand was 1,366-1,409 feet and the well is shut in with 11,000,000 feet of gas. Briscoe & Hall have a rotary rig in for No. 1 Milner, CSE SE, Section 23-4-8w. Becker & Reid's No. 1, CSE SW, Section 3-3-10w, is pumping 20 bbls. from sand 1,432-49 feet.

Okmulgee District

Near Beggs, the Shaffer Oil & Refining Co. has a rig on the ground for No. 9 Carolina, SW cor. SE SE, Section 17-15-11. The Carter Oil Co. and E. P.

New Mexico Field Operations

By Special Correspondent

ARTESIA, N. Mex., Jan. 9.—Total production for the Artesia Field during the past year, according to figures of the New Mexico Pipe Line Co. and the Illinois Pipe Line Co., was 704,000 bbls., exclusive of the crude used for fuel in the field, amounting to an additional 150,000 bbls. On January 1, 1925, there were 5 completions and 12 drilling wells in the entire Artesia Field. On January 1, 1926, there were 126 producers with 35 drilling wells. The majority of the oil is coming from pumpers, although many of the wells continue to flow naturally.

Two more wells have picked up the deeper pay, these being Twin Lakes Oil Co.'s No. 6 in the SW of Section 28-18-28, and the Ohio Oil Co.'s No. 6 in the NE NE of the same section. The Twin Lakes' No. 6, following a shot of 200 quarts, run from 2,568-2,615 feet, is swabbing 60 bbls. daily while being cleaned out. Following the shot, for a period of 40 hours, the well failed to make a barrel of oil, the heat apparently sealing off the lime. Another pay has been been picked up in the Ohio Oil Co.'s No. 6 Toomie Allen at a depth of 2,820 feet, the well swabbing from 75 to 100 bbls. daily. A 3,600-foot test will be made by this company, a standard rig to be moved on its No. 1, which has been a fair producer since its completion. This well is also located on the Tommie Allen lease.

In the north extension, The Texas Co. has picked up a new sand in its No. 4, located in Section 5-18-28, at a depth of 2,556-2,610 feet, the hole now standing 1,400 feet in fluid.

In the upper pay, three completions were made during the week. Flynn, Welch & Yates' No. 35, in the NE of the NW of Section 29-18-28, is a good producer from 2,309-2,338 feet. This company's No. 37, in Section 17-18-28, also appears to be a good producer from a depth of 2,140 to 2,154 feet. The Williams No. 3, in Section 17-18-28, is estimated at 100 bbls., this coming from 2,027-2,160 feet.

In Section 16-18-28, Compton Brothers have apparently again missed the pay sands, this well now being 3,160 feet. Sixty feet of dry sand was encountered at this depth.

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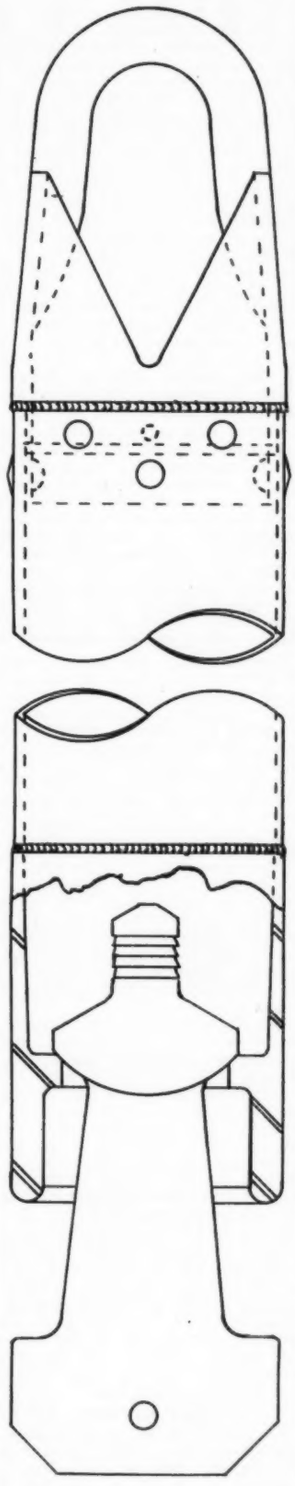

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Jones are drilling at 700 feet in No. 1, SE cor. NW SE, Section 9-15-12. Olean Petroleum Co. has a dry hole in No. 9, CEL SW NW, Section 14-15-12, which is being plugged from a total depth of 1,565 feet. Phillips Petroleum Co.'s No. 1, NE cor. SE, Section 22-15-12, had the sand 2,133-60 feet and is making 35 bbls. naturally. It it not completed. W. B. Hammond has the rig built for No. 4 Lee, SE cor. SW SW, Section 26-15-12. Hammond and others have spudded No. 1, C E half NW, Section 35-15-12. Vierson and others have completed a gas well in No. 1, NE cor. NW NW, Section 35-15-12. Sand was 1,850-71 feet and the well is shut in and completed for 22,000,000 feet of gas. H. C. Detrick has the rig and tools in for No. 1 Ragan, SE cor. SE, Section 21-14-12. T. A. Johnston Co.'s No. 2, SW cor. NW, Section 22-14-12, had the top of the lime 1,960-68 feet and sand 1,968-70 feet. The well is making 125 bbls. and is not completed. Independent Oil & Gas Co. has the rig on the ground for No. 1, CSL SW SE, Section 25-14-12. Kingwood Oil Co. is drilling at 150 feet in No. 2, NE cor. SW NE, Section 36-14-12.

West of Bald Hill in the Wilcox sand pool, the Independent Oil & Gas Co. and the Devonian Oil Co.'s No. 6, SW cor. SE SW, Section 7-15-13, had sand 2,125-2,204 feet with 6,000,000 feet of gas which was mudded off. The well is not completed; No. 13, CSL SE SE, Section 7-15-13, is drilling at 750 feet. W. B. Pine has completed No. 4 Doyle, NE cor. NW NE, Section 18-15-13, for 30 bbls. after a shot of 2 quarts in sand 2,670-82 feet; and has spudded No. 7, NW cor. NE NW, Section 18-15-13.

Near Bald Hill, the Transcontinental Oil Co. and others have the rig up for No. 1 Beans, SW cor. NW, Section 3-15-14. Swindler and others have built the rig for No. 8 Martin, CWL NE SE, Section 20-15-14. Pulaski Oil Co. has rigged up a machine for No. 1-A Adams, NW cor. NW, Section 33-15-14. Wick Petroleum Co. is drilling an old well deeper in No. 8 Stevens, CSL NW SW, Section 10-14-14. Old total depth was 1,246 feet. J. E. Wallace has a rig in for No. 2 Colbert, NE cor. NW NW, Section 14-14-14. F. H. Andrews is rigging up No. 4 Hardridge, NW cor. SW NW, Section 32-14-14. George I. Wilson and others have completed a gas well in No. 5, CNL NW SE, Section 15-15-15. Sand was 757-818 feet and the well is shut in with 1,500,000 feet of gas.

Near Youngstown, J. A. Swindler & Sons have a dry hole in No. 5, CNL SW NE, Section 25-13-11, which is abandoned at 3,255 feet. E. R. Black has a duster in No. 1, NE cor. SW SW, Section 27-13-11, at 3,365 feet. L. C. Wheeler is drilling at 560 feet in No. 3, SW cor. SW, Section 31-13-12. Eagle Picher Co. and E. L. Kistler's No. 2, SW cor. SE NE, Section 32-13-12, had sand 2,290-94 feet with 3,000,000 feet of gas and is not completed.

In the North Baltimore Pool, Keaton & Gold are drilling at 500 feet in No. 2, CEL NE NE, Section 14-12-11. Windsor Oil Co. and others are drilling at 450 feet in No. 3, SE cor. SW NW, Section 15-12-11. In the Josey Pool, the Josey Oil Co.'s No. 1, SW cor. NE NW, Section 33-12-11, had the Wilcox sand 3,548-50 feet and made 711 bbls. with the tools in the hole.

Other Operations

West of Henryetta, Vierson and others have spudded No. 3, NW cor. SW, Section 3-12-12. Morton and others have completed No. 6, SE cor. SW NE, Section 7-12-12, for 40 bbls. after a shot of 20 quarts in sand 2,380-2,521 feet. Wooster Oil Co.'s No. 7, CSW NE, Section 33-12-12, had sand 2,459-65 feet with a hole full of water and was plugged back to a shallow sand 1,485-1,544 feet and shot with 40 quarts. It is making 25 bbls.

Near Morris, Lebow and others have a rig on the ground for No. 11 Doyle, CEL NE SW, Section 15-13-14. Sommerville and others have a rig and tools in for No. 8-A Hill, CEL NW SW, Section 25-13-14. Near Eram, Thrasher and others have built a rig for No. 6 Rentie, NE cor. SW SW, Section 18-14-15. Boomer Oil Co. has a rig up for No. 1-A London, CNL NE NW NW, Section 12-13-16.

Near Okemah, the Independent Oil & Gas Co. has completed a gas well in No. 1, NE cor. NE, Section 25-11-9. Sand was 2,960-71 feet and the well is shut in with 6,000,000 feet of gas.

In Tiger Flats, the Barbara Oil Co. has a dry hole in No. 2, CWL SE NE, Section 3-11-11, which is abandoned at a total depth of 3,030 feet. Dec'us & Moffet have moved in a rig to drill an old well deeper in No. 2 Skinner, SW cor. SE NE, Section 17-11-12. Lou Umburn and others have spudded No. 1, SE cor. NW, Section 16-10-11.

Near Schulter, the Pulaski Oil Co. has a twin rig up for No. 7-A Bruner, SE cor. NW SW, Section 36-12-13, and is building the rig for No. 10 Bruner, NW cor. SW SW, Section 36-12-13.

Kewanee Oil Co. has built the rig for No. 2 Brown, NE cor. SE SW, Section 1-11-13. Mickelson and others have a machine on the ground for No. 1 Davis, C S half NE, Section 23-11-13.

In the Papoose Pool, the Carter Oil Co. has completed a gas well in No. 3, NE cor. NW SE, Section 1-9-9. Sand was 3,386-3,421 feet and the well made 6,000,000 feet of gas and 170 bbls. of oil.

In the Fuhrman Pool, the Independent Oil & Gas Co. and the Transcontinental Oil Co. have spudded No. 2, NW cor. SW NE, Section 26-9-9. The Independent Oil & Gas Co. is drilling at 500 feet in No. 1, SE cor. NE NE, Section 27-9-9. J. W. McCulloch Co. is drilling at 950 feet in No. 1, SW cor. NE NE, Section 27-9-9. Waite Phillips Co. has spudded a well south of the pool in No. 1, NW cor. NW, Section 35-9-9. Roxana Petroleum Corp. has spudded a test east of the pool in No. 1, SW cor. NE, Section 24-9-10. Carter Oil Co. and Sands Petroleum Co. have spudded No. 1, NE cor. NW, Section 31-9-10.

Okfuskee County

Mid-Kansas Oil Co.'s No. 2, NW cor. NE, Section 17-12-7, swabbed 37 bbls. from sand 2,893-2,900 feet, but found a hole full of water at 2,901 feet. The casing is being pulled and the well is not completed. Darby Petroleum Co. has a rig on the ground for No. 2 Callahan, NE cor. NW SW, Section 14-13-9. H. C. Detrick has spudded No. 1 Stephens, SE cor. SE, Section 1-13-10.

Garfield County

Shaffer Oil & Refining Co. is rigging up No. 1, NW cor. NE, Section 32-24-4w. Faling and others have a duster in No. 1, NW cor. SW NW, Section 35-23-3w. This is in line between Billings and Garber and the well is dry and abandoned at 2,280 feet.

North of the Garber Field, the Prairie Oil & Gas Co. has the rig on the ground for No. 12 Wishard, SW cor. SE SE, Section 12-22-4w. Roxana Petroleum Corp. is building the rig for No. 4-W Wolfe, SE cor. NE NW, Section 13-22-4w. Sinclair Oil & Gas Co.'s No. 26 Walker, CNL NW SW NE, Section 13-22-4w, had sand 4-396-4,428 feet and made 2,300 bbls. naturally; the rig is being built for No. 31 Walker, SW cor. NE NE, Section 13-22-4w; for No. 32 Walker, NE cor. SW NE, Section 13-22-4w; for No. 33 Walker, SE cor. NW NE, Section 13-22-4w; No. 34 Walker, SW cor. NW NE, Section 13-22-4w, and No. 35 Walker, NW cor. NE, Section 13-22-4w, are rigged up; No. 36 Walker, NE cor. NW NE, Section 13-22-4w, is spudded.

Hopper and others have abandoned the location for No. 1 NE cor. SW, Section 27-22-4w. In Garber, the Sinclair Oil & Gas Co. has completed a well in No. 15, SE cor. SW NE, Section 36-22-4w. Sand was 2,150-69 feet and the well made 40 bbls. naturally. Crews Heirs Oil Co. has a failure in No. 18-B Crews, SW cor. NE SW, Section 19-22-3w, which is to be abandoned at 4,532 feet. Sinclair Oil & Gas Co. has completed No. 24, SE cor. NW NW, Section 19-22-3w, and the well is making 1,335 bbls. oil and 1,000 bbls. water from sand 4,375-80 feet. Roeppler and others' No. 1, NW cor. SW SW, Section 20-22-3w, had sand 1,697-1,700 feet and made 25 bbls. on the swab. Elmo Oil Co. has spudded No. 5, CWL NE SW, Section 31-22-3w.

Marshall County

Humble Oil & Refining Co.'s No. 1, CNL NE NE NE, Section 25-5s-5, is dry and abandoned at a total depth of 1,025 feet.

Carter County

In the Brock Pool, the Amerada Petroleum Corp. has a well in No. 21, CNL NE NE SE, Section 20-5s-1. Sands were 1,250-75 feet and 1,550-75 feet. Perforated casing was run to permit the well to produce from the upper sand and it is making 20 bbls. No. 21, C S half SE NE, Section 20-5s-1, had the sand 1,528-35 feet and is making 60 bbls.; No. 20, C S half S half NE, Section 28-5s-1, had sand 1,065-76 feet and is good for 50 bbls. No. 11, CSL NE SE NW, Section 28-5s-1, is drilling at 450 feet. No. 12 Blow, CSL SE NE NW, Section 28-5s-1, is a machine. No. 1, CWL NE NW, Section 34-5s-1, is good for 15 bbls. from sand 1,182-1,212 feet. This well had a total depth of 1,595 feet and was plugged back.

Johnston County

Tom Deese and others have run the 20-inch casing in a wildcat well No. 1 Chastain, NE cor. SW, Section 24-4s-5.

Stephens County

Beasley & Lain have a rig on the ground for No. 1 Cochran, SE cor. SW, Section 6-1-8w.

Lincoln County

The wildcat well of Flynn & Moran, north of the Davenport Pool, is drilling at 3,482 feet. This well, No. 1, NE cor. NW SW, Section 25-15-5, had a sand 3,399-3,414 feet with 2,000,000 feet of gas. Magnolia Petroleum Co. is rigging up No. 2 Smith in the Davenport Pool, SE cor. NW SE, Section 34-15-5, and No. 5, SW cor. SE SE, Section 34-15-5, had sand 3,404-95 feet and is doing 100 bbls. after being shot with 40 quarts; No. 7 Smith, NE cor. SW SE, Section 34-15-5, is being rigged up. Pure Oil Co.'s No. 5, NE cor. SE SW, Section 35-15-5, is making 70 bbls. after a shot of 15 quarts in sand 3,330-72 feet. Phillips Petroleum Co. has built the rig for No. 1 Sharp, SE cor. NE, Section 35-15-5. Pure Oil Co. has built the rig for No. 6 Jefferson, NW cor. SW SW, Section 35-15-5. The Carter Oil Co. is drilling at 375 feet in No. 3, SW cor. SE SE, Section 6-15-6. Amerada Petroleum Corp. has set the surface casing in No. 2, SW cor. NE SE, Section 2-14-5. The Texas Co. has built the rig for No. 7 Baker, NE cor. SW SE, Section 2-14-5. Amerada Petroleum Corp.'s No. 2, NW cor. NE SW, Section 3-14-5, is making 60 bbls. after a shot of 30 quarts in sand 3,425-67 feet. Magnolia Petroleum Co. has a good well in No. 6, NE cor. SW NE, Section 3-14-5. Sand was 3,367-3,473 feet and the well made 620 bbls. after a shot of 30 quarts. Prairie Oil & Gas Co.'s No. 15 Stout, SW cor. NW, Section 3-14-5, is a 1,000-bbl. well after a shot of 30 quarts in sand 3,422-66 feet. Phillips Petroleum Co. is running the surface pipe in No. 3, SE cor. NE, Section 10-14-5, and No. 1, NE cor. SE NE, Section 10-14-5, is flowing 280 bbls. a day from sand 3,350-3,401 feet. The well was shot with 30 quarts. Shaffer Oil & Refining Co. is drilling at 250 feet in No. 2, SE cor. NE NE, Section 10-14-5.

Tulsa County

Sand Springs Home has a duster in No. 3, CEL SW, Section 3-19-11, which is dry and abandoned at 2,283 feet. The Mississippi lime was topped at 1,899 feet, the Wilcox sand was found 2,200-13 feet.

(Continued on Page 209)

Kansas Oil Field News

By J. L. Dwyer

While the daily production of the State slipped below the 100,000-bbl. mark, there was very little unusual news from the Kansas fields last week. The Rainbow Bend Pool in Cowley County offered one completion, No. 2 Bryan, NW cor. SW SE, Section 21-33-3, which made 75 bbls. on the swab from sand 3,243-99 feet, for the owners, Waite Phillips Co. and others. West of Rainbow Bend just across the line in Sumner County, the Marland Oil Co. has made the location for No. 2 Holman, SW cor. SE NE, Section 24-33-2.

The Russell Pool in Russell County offered no completions last week, and the daily production of the pool is about 4,500 bbls.

In Lyon County the most recent development was the purchase by the Independent Oil & Gas Co. of Tulsa, Okla., of a half interest in the block owned jointly by J. W. McCulloch and Ralph Talbot of Tulsa and A. G. Hazlett of Morris. The Independent purchased the interest which was held by Talbot and Hazlett, and this purchase again joins them in partnership with McCulloch, who was formerly general manager of the company. The block comprises 1,800 acres and it has one well producing 450 bbls. daily. The well is 90 days old, and its production is being utilized largely for fuel oil which is sold to the railroads in the vicinity. The price reported paid for the block is $250,000 of which $125,000 was paid in cash and $125,000 will be paid in oil.

In the Blunt district of Butler County, John Rogers and others' No. 1 Laughlin, NE cor. NE, Section 33-27-7, is estimated at 150 bbls. in sand 2,725-45 feet. This is a west offset to the discovery well.

Greenwood County

Greenland Oil Co. has spudded No. 4, NE cor. NW SW, Section 25-23-8, and the rig is on the ground for No. 5 Craft, NW cor. SW SW, Section 25-23-8. Hayes Robertson has spudded No. 10, SW cor. NW NE, Section 25-23-8. The Greenland Oil Co. has the rig on the ground for No. 20 Green, NE cor. NW SE, Section 10-23-9. White Eagle Oil Co. has abandoned No. 3, CWL NW SE, Section 19-23-9, at 1,635 feet and skidded the rig for a twin well.

In the Browning district, the Syndicate Oil Co. has a dry hole at 2,160 feet in No. 1, CEL SE SW NE, Section 2-22-10. Phillips Petroleum Co. has built the rig for No. 1 Pixlee, NW cor. NE, Section 3-22-10. Tidal Oil Co. & Jones are drilling at 350 feet in No. 1, NE cor. NW, Section 3-22-10, and the rig is up for No. 2 Pixlee, NW cor. NE NW, Section 3-22-10. Theta Oil Co. has spudded No. 7 Pixlee, SE cor. NE SE, Section 8-22-10. Troxell and others have spudded No. 1, NE cor. SW, Section 24-22-10. The Texas Co. is drilling at 400 feet in No. 3, SW cor. NW SW, Section 29-22-10, and the rig is on the ground for No. 4 Prather, CNL NW, Section 29-22-10. Syndicate Oil Co. has the rig up for No. 1 Borrer, SE cor. NE NE, Section 20-23-10. Roth, Faurot and the Mission Oil Co. have a duster in No. 3, NW cor. SE NW, Section 22-23-10, which is abandoned at 2,263 feet.

Empire Gas & Fuel Co. has completed No. 3, NE cor. NW SW, Section 14-22-11, for 50 bbls. after a shot of 90 quarts in sand 1,812-1,904 feet. Simmons & Burk have rigged up No. 3 Harris, CEL NE NW, Section 19-22-11. Phillips Petroleum Co. has the rig up for No. 4 Hillard, CEL SE SW, Section 33-22-11, and also for No. 1 Gardner, NE cor. NW NE, Section 5-22-12.

Sullivan and others have moved a machine in for No. 2 Freeman. NW cor. NE SW, Section 6-24-11. In the Eureka district, Crown Central Co. has spudded No. 1, SW cor. NW NE, Section 13-26-9.

Cowley County

Roth & Faurot's No. 1, SW cor. SE SW, Section 20-31-5, is dry and abandoned at 1,728 feet. Shawver & Sutter

(Continued on Page 206)

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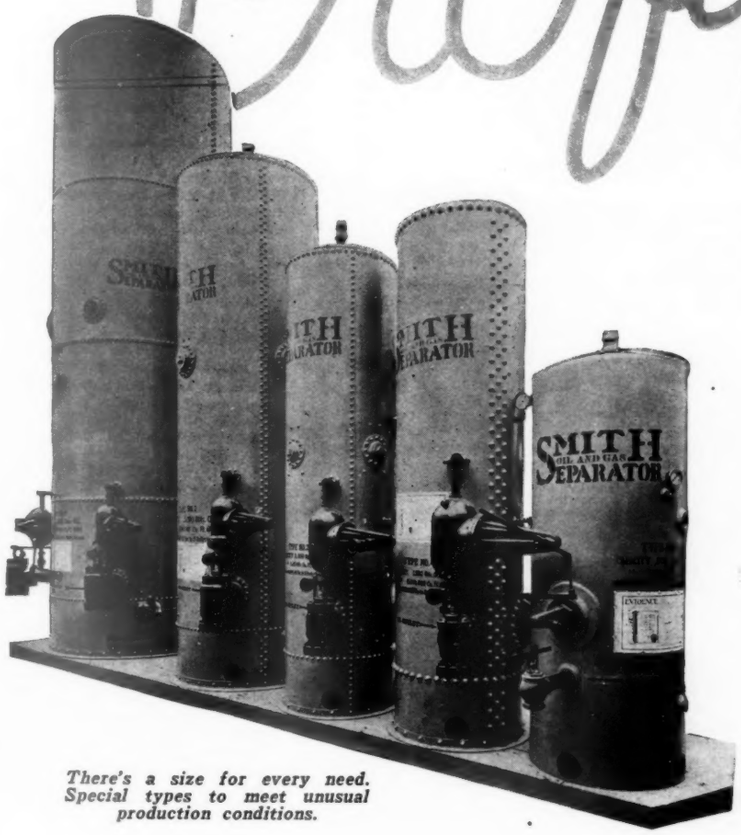

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North Central Texas

By George R. Kelley

Big Lake Co.'s No. 54 University, Reagan County, blows in unexpectedly, burning rig and two members of crew. Humble Oil Co.'s No. 3 Powell testing acreage bought from World Oil Co. Humble Co. gets two good producers in Wilbarger County. Magnolia gets deep duster in Wise County.

FORT WORTH, Tex., Jan. 11.—The Big Lake Oil Co. has another big producer in Reagan County, No. 54 on University land, which is reported to have blown in unexpectedly early this week, set the rig on fire and burned two of the drilling crew to death. Though the well was 3,065 feet deep, about the level at which it should have come in, apparently the well had not been showing anything and the crew was drilling ahead waiting for the showing before taking precautions.

The drill hit a gas pocket which caused the fire and two of the crew were overcome by the gas. They were taken from the derrick floor and the only remaining member of the crew then went for help. While he was away the well started flowing and the unconscious workmen were drenched in burning oil. The well is now flowing at the rate of 120 bbls. an hour or 2,880 bbls. daily.

According to the latest field reports Humble Oil & Refining Co.'s No. 3 Powell in Crockett County has reached a total depth of 2,565 feet and the drill is in a red sand. The crew is underreaming the 8¼-inch casing set at 2,545 feet.

This well is regarded as a very important test of the Humble Oil & Refining Co.'s block of Crockett County acreage which it purchased last summer from the World Oil Co., when a well on the Powell ranch drilled by the World Co. began showing for production at about 2,650 feet. The Humble drilled its No. 2 Powell to the west of the discovery and its No. 1 Harris to the north. The No. 2 Powell was a very small producer and the Harris was a dry hole. The No. 3 Powell is 1,100 feet south of the discovery and is, therefore, regarded as very important in determining the value of the company's purchase.

In Upton County, to the west of the Big Lake district, the Plateau Oil Co.'s No. 1 Union Land Co. is drilling ahead and has encountered the salt at 555 feet. This is regarded as a very favorable level for encountering this marker in the Upton County district.

The Humble Oil & Refining Co. has two new producers on the Waggoner Ranch in Wilbarger County, which have not been completed, No. 1-I Waggoner making 250 bbls. daily from the sand at 1,886-1,905 feet, and No. 2-I reported good for 275 bbls. flowing by heads from the sand at 1,868-86 feet.

There are also two new producers of fairly good volume in Archer County not yet completed, the Pandem Oil Corp.'s No. 3 Hutcherson is swabbing at the rate of 125 bbls. daily from the sand topped at 1,380 feet and drilled into 12 feet. The Simms Oil Co.'s No. 2 Richardson is also a new producer, estimated good for 100 bbls., producing from only 4 feet of sand at a total depth of 1,450 feet.

In Stephens County, the Landreth Production Co.'s No. 4 Gratz has come in a gasser from the sand at 1,965 feet. This well is on the same lease as the Landreth Co.'s big oil producer which came in last month, No. 3 Gratz, which had a flush production of 1,275 bbls. daily from the sand at 3,128-43 feet. No. 4 Gratz is registering about 8,000,000 feet of gas daily, though it is not completed at this depth.

The Magnolia Petroleum Co. has just completed an unusually deep duster in Wise County, North Texas, No. 1 Cassidy Southwestern Commission Co., which was drilled to a total depth of 5,858 feet, or considerably over a mile in depth. It is reported, though not officially, the Magnolia will drill another test in this territory.

The Cross Plains Townsite Pool in Callahan County did not make such a good showing as for several weeks past. Some dry holes are beginning to show up. Three out of five completions on the townsite were dry holes.

Average Pipe Line Runs

Average daily pipe line runs this week are somewhat higher. The total production shows a daily average of 171,195 bbls. against a daily average last week of 170,360 bbls., a gain of 835 bbls. daily.

Though this week showed a few more completions, the amount of new production is considerably short of that furnished last week. This week provided a total of 89 completions, 52 of which were oil producers, 36 were failures and 1 was a gas well. The 52 oil producers had a new production of only 4,630 bbls. against 5,490 bbls. last week from 43 new producers.

Archer County ranked first in number of completions with a total of 26 and second in amount of new production with 1,115 bbls. Wilbarger County ranked fourth in number of completions with 9 and first in new production with 1,895 bbls. Young County made another poor showing, turning in 10 new completions, only 3 of which were producers, with 260 bbls. of new flush production. Stephens County had only 1 completion, a small producer making 25 bbls., and Eastland County had 2 completions, both of which were dusters.

The following table gives the completions by counties together with the new production from each county:

County—	Comp.	Prod.	Dry	Gas	New Prod.
Wichita	17	12	5	0	615
Wilbarger	9	9	0	0	1,895
Archer	26	16	10	0	1,115
Young	10	3	7	0	260
Stephens	1	1	0	0	25
Eastland	2	0	2	0	.....
Brown	5	4	1	0	95
Callahan	5	2	3	0	350
Wheeler	1	1	0	0	20
Baylor	2	1	1	0	35
Shackelford	2	1	1	0	90
Clay	1	0	1	0	.....
Montague	1	1	0	0	30
Cooke	1	0	1	0	.....
Wise	1	0	1	0	.....
Throckmorton	1	0	1	0	.....
Mitchell	1	1	0	0	100
Coleman	1	0	0	1	*
Upton	1	0	1	0	.....
Pecos	1	0	1	0	.....
Total this week	89	52	36	1	4,630
Total last week	81	43	37	1	5,490
Difference	8	9	1	0	860

*Coleman County reported one gas well with a production of 5,500,000 feet of gas daily.

PRODUCTION REPORT
Week Ending January 7, 1926

Gulf Production Co.	485	
Humble Oil & Refining Co.	355	
Magnolia Petroleum Co.	2860	
Panhandle Refining Co.	240	
Prairie Oil & Gas Co.	20	
Sinclair Oil & Gas Co.	55	
Sun Oil Co.	85	
The Texas Co.	360	
Texhoma Oil & Refining Co.	505	
Miscellaneous	8000	
Total		12,945
Electra		
Empire Gas & Fuel Co.	955	
Gulf Production Co.	975	
Humble Oil & Refining Co.	3585	
Magnolia Petroleum Co.	3585	
Panhandle Refining Co.	50	
Prairie Oil & Gas Co.	130	
The Texas Co.	3400	
Texhoma Oil & Refining Co.	1660	
Miscellaneous	6585	
Total		17,470
Iowa Park		
Gulf Production Co.	40	
Humble Oil & Refining Co.	205	
Magnolia Petroleum Co.	560	
Panhandle Refining Co.	40	
The Texas Co.	370	
Texhoma Oil & Refining Co.	30	
Miscellaneous	4150	
Total		5,395
Wilbarger County		
Gulf Production Co.	35	
Humble Oil & Refining Co.	3700	
Prairie Oil & Gas Co.	50	
Miscellaneous	11325	
Total		15,110
Archer County		
Empire Gas & Fuel Co.	1055	
Gulf Production Co.	3315	
Humble Oil & Refining Co.	455	
Magnolia Petroleum Co.	1855	
Panhandle Refining Co.	150	
Prairie Oil & Gas Co.	3010	
Sun Oil Co.	470	
The Texas Co.	2485	
Texhoma Oil & Refining Co.	2355	
Miscellaneous	18670	
Total		32,829
Stephens County		
Empire Gas & Fuel Co.	35	
Gulf Production Co.	1345	
Humble Oil & Refining Co.	675	
Magnolia Petroleum Co.	420	
Mid-Kansas Oil & Gas Co.	1500	
Prairie Oil & Gas Co.	850	
Sinclair Oil & Gas Co.	70	
Sun Oil Co.	170	
The Texas Co.	1265	
Texas Pacific Coal & Oil Co.	1220	
Miscellaneous	7325	
Total		14,875
Ranger		
Gulf Production Co.	240	
Humble Oil & Refining Co.	35	
Magnolia Petroleum Co.	420	
Mid-Kansas Oil & Gas Co.	175	
Panhandle Refining Co.	130	
Prairie Oil & Gas Co.	650	
Sinclair Oil & Gas Co.	325	
The Texas Co.	155	
Texas Pacific Coal & Oil Co.	770	
Miscellaneous	2755	
Total		5,855
Moran		
Empire Gas & Fuel Co.	30	
Humble Oil & Refining Co.	10	
Prairie Oil & Gas Co.	15	
The Texas Co.	340	
Texhoma Oil & Refining Co.	90	
Miscellaneous	2020	
Total		2,505
Young County		
Gulf Production Co.	190	
Humble Oil & Refining Co.	460	
Magnolia Petroleum Co.	285	
Mid-Kansas Oil & Gas Co.	15	
Panhandle Refining Co.	150	
Prairie Oil & Gas Co.	10	
Sinclair Oil & Gas Co.	375	
Sun Oil Co.	60	
The Texas Co.	530	
Texhoma Oil & Refining Co.	625	
Miscellaneous	6580	
Total		9,280
Eastland-Comanche		
Empire Gas & Fuel Co.	10	
Humble Oil & Refining Co.	140	
Magnolia Petroleum Co.	730	
Mid-Kansas Oil & Gas Co.	175	
Prairie Oil & Gas Co.	120	
Sinclair Oil & Gas Co.	25	
The Texas Co.	150	
Texhoma Oil & Refining Co.	100	
Miscellaneous	1585	
Total		3,035
Panhandle		
Carson County	2290	
Hutchinson	2935	
Wheeler	125	
Gray	40	
Total		5,390
Miscellaneous Pools		
Clay	405	
Montague	920	
Jack	25	
Throckmorton	190	
Baylor	260	
Palo Pinto	520	
Brown	2200	
Coleman	289	
Callahan County	5630	
Mitchell	3085	
Reagan	32785	
Scurry	70	
Crockett	45	
Total		46,415
Total this week		171,095
Total last week		170,360
Gain		735

Wichita County—Completions

Bonchil Co.'s No. 3 Bentley, 20 bbls. at 1,195 feet; No. 13 Beach, 30 bbls. at 1,186 feet; No. 14 Beach, 5 bbls. at 215 feet; No. 15 Beach, 5 bbls. at 540 feet; Fisher and others' No. 9 Birk, 20 bbls. at 1,617 feet; Loning and others' No. 1 Riley, dry at 1,362 feet; Magnolia Petroleum Co.'s No. 13 Dodson, dry at 1,406 feet; Vannest Oil Co.'s No. 16 M. K. & T., 50 bbls. at 1,186 feet; No. 17 M. K. & T., 25 bbls. at 990 feet; No. 18 M. K. & T. dry at 225 feet; Bullington and others' No. 12 Jennings, 340 bbls. at 1,617 feet; Hammon and others' No. 6-B Waggoner, dry at 1,754 feet; No. 3-A Burnett, 100 bbls. at 1,515 feet; Magnolia Petroleum Co.'s No. 53 Rio Bravo, 5 bbls. at 1,018 feet; No. 10 Watkins, 5 bbls. at 852 feet; Ryan Petroleum Co.'s No. 48 Nance, 10 bbls. at 501 feet; Texhoma Oil & Refining Co.'s No. 1 Ferguson, dry at 2,016 feet.

Wilbarger County

Barkley and others' No. 8-A Stephens, 400 bbls. at 2,358 feet; No. 9-A Stephens, 390 bbls. at 2,358 feet; Humble Oil & Refining Co.'s No. 18-B Castlebury, 35 bbls. at 2,054 feet; No. 3-H Waggoner, 300 bbls. at 1,879 feet; Landreth Production Co.'s No. 3-A Waggoner, 200 bbls. at 1,862 feet; No. 5-A Waggoner, 45 bbls. at 1,198 feet; No. 6-F Waggoner, 200 bbls. at 1,904 feet; No. 1-H Waggoner, 300 bbls. at 1,875 feet; Murchison and others' No. 2 Ditto, 25 bbls. at 1,305 feet.

Archer County

Barkley and others' No. 17 Wilson, 45 bbls. at 1,521 feet; No. 18 Wilson, 15 bbls. at 1,535 feet; Burns and others' No. 11 Wilson, 10 bbls. at 1,436 feet; Maer andothers' No. 2 Hutcherson, dry at 1,395 feet; Norwood and others' No. 1 Rutty, dry at 1,618 feet; Phillips Petroleum Co.'s No. 89 White, 70 bbls. at 1,623 feet; Riner and others' No. 30-B Wilson, dry at 1,660 feet; Sibley and others' No. 13 Wilmot, 10 bbls. at 1,405 feet; Staley and others' No. 9 Kemp & Kempner, 125 bbls. at 1,577 feet; No. 10 Kemp & Kempner, 350 bbls. at 1,584 feet; The Texas Co.'s No. 1 Taylor, dry at 1,874 feet; Wilson Drilling Co.'s No. 1 Wilson, dry at 1,656 feet; No. 5-A Wilson, 15 bbls. at 1,519 feet; Atlantic Oil Production Co.'s No. 1 Falls County, 35 bbls. at 1,171 feet; B. S. & B. Oil Co.'s No. 1 Parkey, dry at 1,575 feet; British American Oil Co.'s No. 10 Rogers, 20 bbls. at 1,280 feet; Davis Hart Co.'s No. 17 Roach, 10 bbls. at 1,241 feet; Green and others' No. 2-A Wilburn, dry at 1,390 feet; Ilsing Production Co.'s No. 2 Prideaux, 10 bbls. at 669 feet; Independent Oil & Gas Co.'s No. 1 Wolf, 95 bbls. at 1,317 feet; Kentucky Oil Corp.'s No. 1 Baggett, dry at 1,356 feet; Magnolia Petroleum Co.'s No. 10 Lowe, 30 bbls. at 1,258 feet; M. & V. Oil Co.'s No. 2 Louster, 135 bbls. at 1,176 feet; Pandem Oil Corp.'s No. 5 Cockrell, 140 bbls. at 1,454 feet; Prairie Oil & Gas Co.'s No. 1 Portwood, dry at 1,540 feet; Texhoma Oil & Refining Co.'s No. 1 Lowe, dry at 1,322 feet.

Young County

Allen and others' No. 1 Dunagan, dry at 330 feet; Camp Oil & Gas Co.'s No. 2 Campbell, 30 bbls. at 887 feet; C. G. & C. Co.'s No. 3-B Keathley, 5 bbls. at 980 feet; Consolidated Oil Co.'s No. 1 Gibbs, dry at 1,019 feet; Hoyle and others' No. 1 Benson, dry at 910 feet; Newby and others' No. 1 Lunn, dry at 1,201 feet; Plains Production Co.'s No. 1 Lindsey, dry at 1,106 feet; Texhoma Oil & Refining Co.'s No. 17 Campbell, dry at 952 feet; Tidal Oil Co.'s No. 14 Campbell, 225 bbls. at 927 feet; Willis and others' No. 2 Campbell; dry at 934 feet.

Stephens County

Texas Pacific Coal & Oil Co.'s No. 59 Binney, 25 bbls. at 1,923 feet.

Eastland County

Barkley and others' No. 1 Reid, dry

(Continued on Page 230)

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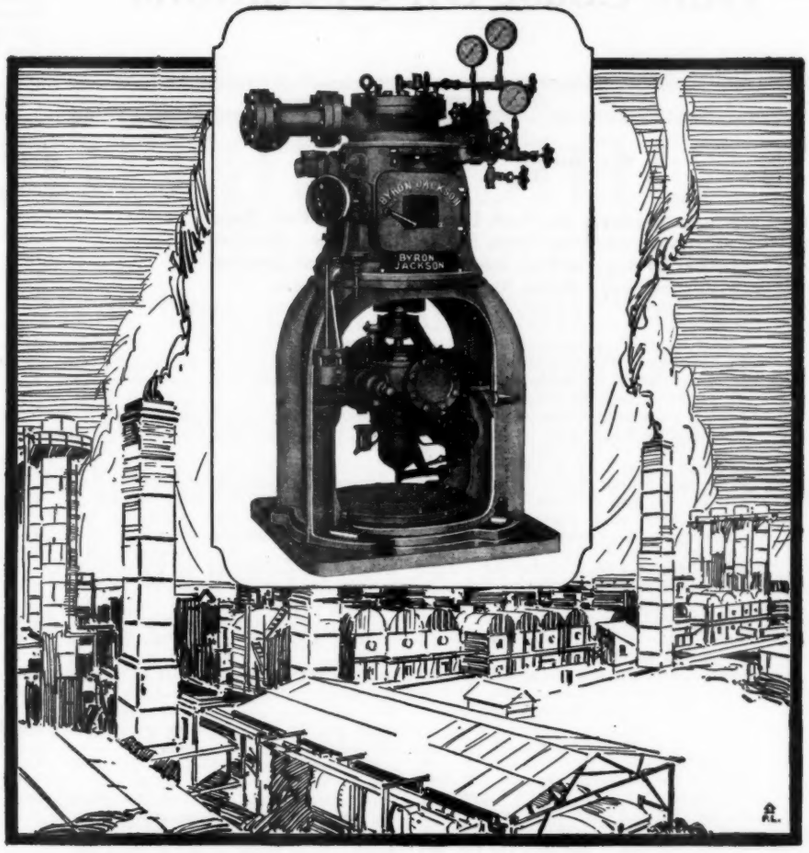

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Gulf Coast Oil Operations

By P. L. McGreal

Rycade Petroleum Corp. gets producer on Nash Dome on line of Fort Bend and Brazoria Counties estimated good for from 500 to 1,000 bbls. Another prospective dome is located at Orchard in Fort Bend County. Recent developments in Coastal area with new pools checks hopes of crude advance.

HOUSTON, Tex., Jan. 11.—The opening of what looks like another producing pool around a saline dome and the abandoning of two deep tests around prospective domes are the features of the week in the Gulf Coast division. A decrease of 2,314 bbls. in the estimated daily average gross production of the Gulf Coast and southwest fields is noted for the week. Bad weather is interfering with development work, both in the pools and outside.

The Rycade Petroleum Corp. started the week with a well off the southeast side of the Nash Dome on the line of Fort Bend and Brazoria Counties that is estimated from 500 to 1,000 bbls., flowing by heads at 4,146 feet. It is the company's No. 5 on the Nash ranch. Casing was set at 4,138 feet with the bit in 12 feet of sand. The oil tests 18 gravity and is a heavy, black product. The hole is clearing itself and throwing out wash water in quantities so that an accurate gauge is impossible at this time. It is flowing into pits.

The Rycade has 11,000 acres under lease on and around the so-called Nash-Wisdom Dome and has drilled 12 tests to date. Development work started in July, 1924, following geophysical explorations with the seismograph and the torsional balance. The location is about 7 miles east of the Damon Mound Pool and 12 miles north of the West Columbia Pool. The territory has been marked by sulphur water springs and gas seepages and water wells showing evidences of oil.

The geophysical tests indicated the presence of a saline uplift, or rock salt and the first test got that formation around 625 feet. More formation tests on the Wisdom partially defined the salt area. No. 2 Wisdom was drilled to 3,600 feet and abandoned after showing some oil sand, but no production. No. 3 Wisdom quit at 1,712 feet. That was last November. Nos. 1 and 2 Nash missed the dome formation and quit. No. 4 Wisdom is now fishing around 1,350 feet.

Acreage Held Closely

The big block of acreage held by the Rycade practically shuts out all other companies, as the area appears at present, judging from the past tests. The well is on the southeast side of the dome. The Humble Oil & Refining Co. has a small tract some 2,100 feet southwest of the well, while the Sun Oil Co. and the Marland Oil Co. of Texas have two 50-acre tracts west of the Humble company.

No additional storage has been provided, waiting to see what the well will develop into. A pipe line can be laid west to Damon Mound, or the oil can be shipped out over the Rosenburg-Damon Mound branch of the Southern Pacific Railroad.

Another prospective dome is at Orchard, 6 miles northwest of Rosenburg, Fort Bend County, where the Gulf Production Co.'s No. 5 Moore is showing oil and gas in a sand around 3,400 feet. The Orchard Dome is another of the geophysical discoveries where practically all of the likely looking acreage is held by the Gulf company, which has done all the development to date.

The opening of the Boling Dome in Wharton County by The Texas Co. December 14, last, and the development of a deep sand on the southeast side of the Piedras Pintas Dome in Duval County seven days later, followed by the discovery of the Rycade Petroleum Corp. this week, has checked all hope of an advance in quotations for coastal crude. Boling crude grades as "B" and the Humble company grades Piedras Pintas as "A." The grade of the Rycade corporation's well has not been determined yet.

Two deep tests around prospective saline uplifts have been abandoned. The Gulf Production Co. quit No. 4 Thomas off the Fannette Dome in Jefferson County, at 4,670 feet. No. 5 Thomas is drilling around 1,100 feet with a location made for No. 6 Thomas.

The same company abandoned No. 2 Craig, off the Hawkins Dome in Matagorda County after drilling to 4,900 feet. A location has been made for No. 3 Craig there. No. 1 Craig got rock salt around 700 feet.

Boling Dome

The Atlantic Oil Producing Co. is drilling No. 1 Taylor, located 400 feet northwest of The Texas Co.'s producer off the Boling Dome. The Texas Co. is rigging No. 4 Taylor, 200 feet northwest of the producer. The Sun Oil Co. has a location for No. 1 Taylor and has the Sinclair Oil & Gas Co. for No. 1. These are 200 and 400 feet west of No. 3 Taylor, the flowing well. The Gulf Production Co. is rigging No. 1 Chase and No. 1 Borden.

The Texas Co. is still shipping out the production of No. 3 Taylor in tank cars.

Production Decreases

The estimated daily average gross production of the coastal division for the week ending January 9 is placed at 93,170 bbls., compared with 94,785 bbls. last week. The Texas pools are credited with 82,565 bbls. of the gross and those in South Louisiana with 10,605 bb's. The production from the well off the Nash Dome is not included in the total, but the Piedras Pintas district is included. The estimate for each district is as follows:

District—	Gross Bbls.
Boling	2,600
Batson	1,375
Barber Hill	105
Blue Ridge	750
Big Creek	1,250
Dayton	120
Damon Mound	1,025
Edgerly (La.)	425
Goose Creek	8,860
Humble	4,700
Hull	15,250
High Island	10
Jennings (La.)	1,135
Markham	70
Lockport (La.)	3,025
Orange	16,325
Pierce Junction	1,440
Piedras Pintas	1,800
Spindletop	1,200
Saratoga	1,600
Sour Lake	4,000
South Liberty	9,050
Vinton (La.)	6,975
West Columbia	9,850
Welsh-Anse La Bute (La.)	80
Miscellaneous	150
Total	93,170

Southwest Fields

The estimated daily average gross production for the southwest fields for the same period is placed at 39,796 bbls., compared with 40,495 bbls. last week. The estimate for each field is as follows:

Field—	Gross Bbls.
Luling	20,800
Laredo	3,485
Somerset	2,320
Calliham	246
Rockdale-Minerva	995
Jim Hogg County	3,250
Lockhart	8,700
Total	39,796
Grand total for week	132,966
Grand total last week	135,280
Net decrease	2,314

Including the new Nash Dome there are now a total of 30 producing districts in the heavy gravity class, extending from **New Iberia** westward along the coast to Duval County. The Nacogdoches district is also included in the list as is the section southeast of Kingsville, Kleberg County.

Wells Completed

Wells completed during the week in the coastal area total 20, of which 7 were dry and 1 a salt water well, leaving 12 producers. The new output is 4,225 bbls., the Orange Pool furnishing 2,650 bbls of the gross. At the close of the week 7 wells are bailing.

The deep sand section on the north side of the Batson Pool failed to meet expectations, when the Gulf Production Co.'s No. 1 Smith was completed at 3,200 feet and is flowing only 150 bbls. by heads. It is south of the Kirby Petroleum-Capitol Oil Co.'s No. 3 Hodges, a work-over, that pumped and then sanded. The Sterline Oil Co.'s No. 2 Hooks is pumping 15 bbls. at 1,522 feet. The Paraffin Oil Co.'s No. 103 Paraffin is bailing at 400 feet, as is the Deutser Oil Co.'s No. 14 Trustee, at 950 feet.

In the Goose Creek Pool, the Gulf Production Co.'s No. 32 Beaumont will make a pumper at 2,250 feet. The same company's No. 19 John Galliard is bailing at 4,350 feet, as is the Powell Oil Co.'s No. 6 Bryan.

F. M. Long's No. 1 Hyde went into salt at 2,900 feet on the northwest side of the Humble Pool, where some nice wells have been found recently. Rusk and others got the same formation in their No. 1 on that side. The Texas Co. is drilling No. 1 Fee and the Sun Oil Co.'s No. 1 Bender on the west side is around 3,155 feet.

In the Hull Pool, the Republic Production-Houston Oil Co.'s joint No. 24 Dolbear is making 250 bbls. by heads at 2,350 feet and No. 26 is pumping 50 bbls. at 2,375 feet. Both are old holes that have been redrilled. The Empire Gas & Fuel Co.'s No. 17 Barngrover is pumping 200 bbls. at 3,050 feet. The Higgins Oil & Fuel Co.'s No. 5 Taylor is making 175 bbls. at 4,300 feet. The Humble Oil & Refining Co.'s No. 4 Merchant is pumping 60 bbls. at 4,125 feet. The Mecom Oil Co.'s No. 8 Taylor is bailing at 4,475 feet.

At High Island in Galveston County, the Gulf Production Co.'s No. 3 Smith on the south side of the dome, will pump at 3,000 feet. The Sun Oil Co.'s No. 6 Cade is bailing at 3,300 feet.

The Gulf Production Co. abandoned No. 5 Antonie in the South Liberty Pool at 3,520 feet. Only one rig is now running there, the East Texas Oil Co.'s No. 1 LeCour, drilling below 1,850 feet.

In the Sour Lake Pool, The Texas Co.'s No. 270 fee on the north side, is bailing after being worked over at 2,100 feet.

The Vacuum Oil Co. went into cap rock in No. 2 Teel, on the southwest side

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News of Mexican Fields

By George Blardone

TAMPICO, Mex., Jan. 8.—The final windup of the old year and the commencement of the new found some seven wells completed in Mexican fields, of which three finished in the pay and four were failures. The best well came in as the week ended being rated good for 20,000 bbls. This was Mexican Petroleum Co.'s No. 47 Chapacao (Ebano sector of the northern fields), an offset to National Lines' No. 23. It was finished at 1,763 feet.

In the Panuco Field, Tampascos Oil Co.'s No. 11 Robles is finished at 2,050 feet, and it may prove a 100-bbl. producer.

In the south fields, Transcontinental Petroleum Co.'s No. 7, Lot 17 Zacamixtle is finished at a sub-sea level of 1,733 feet, rated for 500 bbls.

The failures, all of which were in the north fields, follow: International Petroleum Co.'s No. 247, Lot 5 Cacalilao, is a dry hole at 2,250 feet. Mexican Sinclair Petroleum Corp.'s No. 6, Lot 1 Camolote, is also a duster at 1,920 feet. In the Ebano sector, Mexican Petroleum Co. finished two failures, Nos. 8 Mendez and 35 Chijol at 2,455 and 2,220 feet, respectively.

Panuco

Field operations during the week were merely nominal, bad roads and the continuation of the holiday week continuing to act as a brake all along the line. In the Panuco Field the week ending the old year is best reflected as follows: La Corona Petroleum Co.'s Nos. 108 and 110 Piedras are in hard gray lime and limey shales at 1,850 and 490 feet, respectively. East Coast Oil Co.'s No. 443 Ingenio is in gray shale with shell traces at 1,265 feet, and gray lime at 1,565 feet, respectively; and No. 223 Halcon cemented 8-inch in gray lime at 1,312 feet. Martin Head's No. 3-A Piedras cemented 8-inch in gray lime, and is rigging standard, at 1,336 feet. Ita Mex Oil Co.'s No. 16 Tampuche is in hard gray shale at 1,350 feet. International Petroleum Co.'s No. 23 Tanchicuin is shut down in gray lime at 1,550 feet because of weather conditions. Mexican Sinclair Petroleum Corp.'s Nos. 13 and 17 Tananturo each cemented 8-inch in gray lime at 1,408 and 1,220 feet, respectively; its No. 7, Lot 1 Camolote, has done the same at 1,336 feet; its No. 15 Gutierrez has suspended for the time being account the weather in gray lime at 1,400 feet and No. 18 there is ready to spud; and here and there in the field four tests are rigging. Mexican Gulf Oil Co.'s No. 5 Flores is in shale at 227 feet; its No. 9 Zuniga has shut down for orders in the lime at 2,200 feet, looking too deep for a well in this particular sector; its No. 15 Lopez is in gray lime at 1,985 feet. National Oil Co.'s No. 22 Chijoles is in gray lime at 2,200 feet, gassing and showing some oil; its No. 39 has fished out a bailer at 2,180 feet and is resuming also with a showing. The Texas Co.'s No. 5 Isleta is cementing 8-inch at 1,540 feet in hard gray shale and shells. Transcontinental Petroleum Co.'s No. 8 Piedras, in the sector—it will be recalled—that has attracted much interest of late, sent oil over the derrick for a 5-minute head at 710 feet, presumably in the shales with a possible shell break. The oil is high gravity which probably means filtration. At any rate, the test was shut down to test just what this "head" might mean. It is rigging its No. 9 there; and over in the Tanchicuin, its No. 7, Lot 14, is in gray lime at 1,805 feet. It is rigging

(Continued on Page 204)

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California Field Operations

By L. P. Stockman

Completions in Long Beach extension somewhat disappointing as initial production is fairly small and accompanied by large amount of water. Drop in output is rapid and field may not exceed production of 125,000 bbls. daily. Standard Oil Co. gets exceptionally good well at Huntington Beach.

LOS ANGELES, Calif., Jan. 9.—New rigs continue to spring up like mushrooms in the Long Beach extension and, although only four actual spuds were made during the past week, work was started on nine new derricks. At the present time there are 122 strings of tools in operation, all but 11 of which are in the extension. After watching the results of work in this northwest extension, particularly during the past 30 days, I am inclined to believe that many are overestimating its potentiality and that the total output of this field will not exceed my estimate of 125,000 bbls. a day made several weeks ago. As a matter of fact, recent completions in this new area have been somewhat disappointing and, while they may come in doing around 500 bbls. a day, the oil is accompanied by considerable water and the wells do not maintain their initial production for more than a week or 10 days.

Water is causing considerable anxiety, and, although most of it can be freely bled from the lease tanks, the cut in many cases runs as high as 20 per cent and considerably higher in others. That the wells are not holding up is evidenced by a comparison of the present production of various producers with that secured upon completion. In many cases the decline runs as high as 60 and 70 per cent during the first 15 days. Of course, it may be possible to build up the production a little by installing compressors, but so far very little work has been done along this line. The gas pressure in this northwest extension has never been high and, while most of the new wells being finished at present are coming in under a natural flow, several pumpers have been completed during the past few weeks.

A. J. Delaney's No. 5 Los Cerritos, just finished, came in flowing 170 bbls. a day early this week from 4,364 feet, but the well failed to maintain a constant flow and preparations are being made to put it on the beam. The Richmond Oil Co.'s No. 2 Los Cerritos was another well which failed to stand up and, although it came in flowing 385 bbls. less than 10 days ago, it has already been found necessary to put it on the pump. No. 17 Fields of the California Petroleum, finished last week doing 382 bbls., declined to 251 bbls. six days later and is still dropping off. The rapid decline in this extension is not limited to any particular area and, although as a rule the new wel's fail to hold up for any length of time they will, nevertheless, pay out because of the small expenditure required to drill into production, the average being around $45,000.

Completions This Week

The best well added this week was the Lindauer Oil Co.'s No. 2 Cerritos, which came in doing 430 bbls. of 21.2 gravity oil cutting 8 per cent, the hole being carried down to 4,294 feet and finished with a 6¼-inch oil string landed at 4,277 feet. Jim O'Donnell's No. 47 Cerritos was put on the beam at 4,597 feet and pumped 190 bbls. of 21.1 gravity oil, the cut in this case running around 10 per cent. George W. Johnston's No. 2 Los Cerritos has just tested wet at 4,308 feet and another cement job will be necessary on the 8¼-inch. The McKeon Drilling Co. made a preliminary test of its No. 1 Cerritos from 4,329 feet and, although the well flowed intermittently, it does not seem to have pep enough to come into steady production. A little more hole, however, may result in steady production. The Lakeview Oil Co. failed to secure a shut off on the 8¼-inch at 4,326 feet, but later succeeded in effecting a shut off by running in a string of 6¼-inch and cementing at 4,336 feet. The Henderson Petroleum picked up the oil sand in No. 1 Stevens at 4,250 feet and a string of 8¼-inch has been landed and cemented at this depth. The core sample looked unusually promising and the well should be good for at least 300 bbls. on completion. Brawley, Slade & Sweet's No. 1 Long Beach also looks quite promising and a 6¼-inch has been landed at 4,287 feet preliminary to an early test. The Ozark found the top of the pay at 4,320 feet somewhat deeper and the company is getting ready to run in a string of 8¼-inch. The Retsof Drilling Co. picked up a nice showing in No. 76 and, while pipe has not yet been run in, it should be in place tomorrow. Rig construction was started this week by John Abrams, Aiken & Delaney, L. L. Bernstein, Bruce Oil Co., R. A. Burnett, P. L. Cooper, Keck & McWhorter, Marine Oil Corp. and Smith & Lambert.

City Makes Money

Since the discovery of oil at Long Beach, the city has received a total of $3,202,187 from the sale of oil and gas produced on municipally owned land and Terry Carpenter, city accountant, estimates that at least $500,000 more will be paid into the city's coffers within the next six months. The city of Long Beach has leased out a total of 188 acres to the Jergins and Ramsey interests and additional property will be opened for bidding within the next few months if developments warrant. The Jergins Trust is developing 140 acres of the city's land on a 40 per cent basis, while the Ramsey interests are drilling up 37 acres at the same royalty. The city acquired this land about 15 years ago and it was the intention of the municipal water system to build water reservoirs from time to time on the property secured as occasion demanded. At that time the land was not known to be oil bearing, but the discovery by the Shell in 1921 changed the plans of the water department and the property was subsequently leased to the Jergins and Ramsey interests for development.

Dominguez

The Union and Shell are engaged in one of the most interesting experiments that has been undertaken in California during the past few years and, although efforts have been made from time to time to stimulate production by compressed air, no great amount of work has been done along this line. Operators in the Dominguez Field have very wisely refrained from any unnecessary drilling and this gentlemen's agreement has been zealously adhered to. The Union and Shell have not only reduced their drilling programs to a minimum, but their respective engineering staffs have spent considerable time endeavoring to prevent undue wastage and their work has been highly commendable. Numerous tests have been made and a definite ratio of oil and gas production established. Producing wells on the Reyes, Callender, Hellman and Carson leases are equally spaced and the derricks of these leases line up with mathematicial accuracy.

The Shell is conducting the experiment mentioned above on the Reyes lease, the object being to supply the necessary gas pressure by artificial means. No. 4 Reyes, one of the first wells finished in the field, was taken off production two weeks ago and dry gas is now being introduced into the hole under a pressure of 500 pounds. It is taking about 600,000 feet of gas daily and, although no definite results can yet be claimed of the effectiveness of the plan, it is hoped that the experiment will, upon completion, prove successful. In view of the fact that only a comparatively small amount of the oil in any field is recoverable under present methods, the experiment, if successful, will prove one of the most important developments of recent years and increase the petroleum resources to a large extent. With the exception of this experimental work, operations are practically at a standstill in this field, although a few holes are being cleaned out. The gas used at Inglewood is secured from the Shell's gas plant and even if no substantial increase in crude production is effected the dry gas introduced into the hole is returned in a saturated condition. The Union has also been experimenting along this same line at Santa Fe Springs nad Richfield, but it is too early to expect conclusive data. Tests are being made on both individual wells and groups and, while preliminary figures indicate that the tests are likely to prove of value, it is, as stated heretofore, too early to arrive at any final conclusions. In many cases production has been doubled for a short period of time while pumpers have been aided proportionately by raising the fluid level. The principle object at present is to secure as wide a range as possible before passing on the most effective and economical method to be used in later years.

The California Petroleum lost 3,080 feet of hole in No. 2 Wickman at Santa Fe Springs because of mechanical trouble and the rig is being skidded to a new location. This was a new well spudded in a few months ago. The General Petroleum is rigging up rotary equipment in No. 18-A Santa Fe Springs and actual drilling will get under way within the next week. The Pan American is still working on its No. 1 Jesurum at Rideout Heights in an effort to secure clean production, but so far its efforts have been futile. The California Petroleum has just spudded in an offset to the Pan American's No. 1 Jesurum and the bit in this new well, No. 4 Seward-Rideout, is just going through surface formation. The company is coring No. 2 Rideout-Hamburg at 2,120 feet and No. 2 Witt-Vining at 2,370 feet, both of which are scheduled for completion in the shallow zone around 2,500 feet.

Rosecrans

Development work in the Rosecrans Field has simmered down to the drilling of a few wells by the Barnsdall, Union, Walter H. Fisher and one or two other operators, the balance for the greater part consisting of deepening or clean out jobs. The Barnsdall has reentered No. 7 Rosecrans, which made a short flow from 4,523 feet, and will deepen in the hope of stimulating production. Walter H. Fisher recompleted his No. 8 Athens during the week after deepening it to 5,235 feet and the well was brought back flowing 485 bbls. of 33.8 gravity oil. The Superior is making preparations to resume work on No. 1 Maxwell, now at 4,950 feet, and the hole will be carried down for deep production. The Union has one or two potential producers on its Howard Park property, but they are not yet in a position to be given a test.

Inglewood

Not a single completion was finished in the Inglewood Field this week and, although the Pacific and Standard are still engaged in developing their respective properties, new wells from now on will be coming in quite irregularly. The latter company has several drilling projects on its Los Angeles Investment leases and, since No. 36 is scheduled to be bailed for a production test within the next few days, it is quite probable that this well will appear on an early completion list.

During the past few weeks the Standard has been cleaning out some of its small pumpers and this reconditioning work resulted in the return to production this week of Nos. 3 and 9 on Vickers Lease No. 2. Production of the former

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TANKER SHIPMENTS FROM LOS ANGELES TO ATLANTIC AND GULF COAST PORTS

Following is a list of tankers, date departed, destination, kind of cargo and amount in barrels:

Robert E. Hopkins, December 28, New York, crude	75,097
Swiftlight, December 29, Fall River, crude	77,048
Agwiseo, January 1, New York, crude	88,774
Hagood, January 2, Boston, crude	77,252
Coastwise	
Liebre, December 28, Portland, fuel	75,019
K. R. Kingsbury, December 29, Richmond, crude	85,482
S. C. T. Dodd, December 30, Richmond, refined	69,344
Warwick, December 30, Richmond, refined	40,816
Deroche, December 31, Martinez, crude	71,964
W. S. Miller, January 1, Point Wells, fuel	72,116
Los Angeles, January 1, Martinez, crude	70,818
Oleum, January 1, San Diego, fuel	38,231
Solana, January 2, Avon, crude	65,419
K. R. Kingsbury, January 2, Richmond, crude	82,990
Cathwood, January 2, Seattle, fuel	76,208
S. C. T. Dodd, January 3, Richmond, refined	70,736
Richfield, January 3, San Francisco, refined	25,467
Exports	
Nassa (Br.) December 28, Japan, refined	60,589
Albertolite (Br.) December 28, Halifax, crude	82,405
San Jeronimo (Br.) December 28, Chile, fuel	101,726
Meton, December 28, Honolulu, fuel	78,091
Inverleith (Br.) December 29, London, fuel	62,044
Nardanger (Nor.), December 29, London, refined	100,472
D. G. Scofield, December 29, Iquiqui, fuel	73,151
El Grillo (Br.) December 30, Chile, fuel	66,951
Kiyo Maru (Japan) December 31, Japan, fuel	68,932
Argyll, January 1, Santa Rosalia, fuel	32,340
San Felix (Br.) January 2, Buenos Aires, fuel	105,692
Toco (Br.) January 3, Chile, fuel	63,992
From Ventura	
Betterton, January 2, Avon, crude	89,127
From Port San Luis	
Coalinga, December 29, Vancouver, fuel	71,469
Utacarbon, December 29, Balboa, fuel	78,001
From San Francisco	
W. S. Rheem, December 28, Seattle, fuel	92,880
J. A. Moffett, December 28, Point Wells, fuel	64,097
Kewanee, December 29, Linnton, refined	22,148
Capt. A. F. Lucas, December 30, Seattle, refined	37,682
Richmond, December 31, Portland, fuel	62,908

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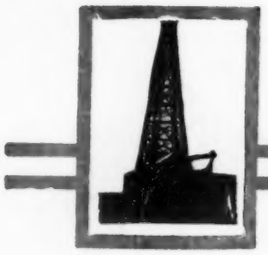

Southwest Texas Fields

By Special Correspondent

Increased activity near Humble well in Piedras Pintas district. Magnolia Co. buys acreage of Ina Oil Co. in Mirando Field. Carolina-Texas gas field proves much more extensive. Edgington district south of Aviators Pool has four new rigs. Bexar County test mile deep.

SAN ANTONIO, Tex., Jan. 11.—Humble Oil & Refining Co.'s No. 4 Walsh, the discovery well of the Piedras Pintas salt dome which came in on December 20, was recently turned on with unrestricted flow for a period of two hours and made during that time at the rate of 10,480 bbls. a day. The well has been pinched in most of the time to a half-inch flow since its completion and up to and including December 31, there had been shipped out over the Texas Mexican Railroad from this well a total of 49 tank cars holding 10,000 gallons each or a total of about 11,600 bbls.

The town of Benavides, 5 miles southwest of the discovery well, has been crowded to overflowing since the well came in but deals have been rather slow of consummation. Kitselman & St. Albans bought 18 acres from Roy Jack in the proven shallow field at Noleda and it is understood paid $400 an acre and gave a sixteenth overriding royalty for the deep stuff. Mr. Jack has been producing from the field from several shallow wells for several years.

Grayburg Oil Co. of this city has bought 160 acres out of Survey 245, about three-quarters of a mile north of the Humble well and is now surveying the tract to make a location for a well. Grayburg will start drilling on the tract within 30 days. Humble is moving in additional rigs to be in readiness for drilling other tests. The loading track at Noleda is being extended. It holds at this time only 19 tank cars or a total capacity of about 4,500 bbls. This has necessitated keeping the discovery well on a restricted flow. Texas Mexican Railroad is extending the track to accommodate more cars and the Humble, which has but limited tanks, is building larger tanks. The well is cased with 4-inch casing and with the gas pressure it is believed that when additional wells are drilled and are cased to the bottom with 6⅝-inch that much larger wells will be brought in. Casing the first well with 4-inch resulted from the well being a wildcat and it was necessary to case off upper sands.

Dixie Oil Co., which bargained for a 40-acre block in Survey 12, located 1,800 feet north of the Humble well, failed to get the tract when the survey was made and it was found that owing to a previous lease to The Texas Co. out of that survey there was not 40 acres left there. A strip about 390 feet wide and over a mile long east and west lying along the south line of the survey and next north of Survey 185 on which the Humble's well is located was found and J. K. Hughes leased it at $2,000 an acre. It is expected it will be drilled soon. The strip is wide enough only for one line of derricks and a producer would necessitate offsets by both the Humble on the south and The Texas Co. on the north.

W. D. Glasscock, a Somerset operator, and associates, own some tracts in fee near the Humble well, the blocks being small and scattered. Mr. Glasscock goes to Benavides this week and while no location has been made it is understood preparations are under way to drill some of the tracts.

The town of Benavides is endeavoring to meet the situation arising from an oil field being opened at its doors. Plans are drawn and work starts at once on a 40-room hotel, a new bank building and new post office building. Various other movements are on foot to take care of the increase in population. A number of oil men who have been unable to pick up acreage near the well have speculated on town lots in the town of Benavides.

Wet Weather Delays

Wet weather in most of South Texas is delaying operators from resuming operations after the holiday shutdown. It had been raining in nearly every oil field up to the middle of last week when the sun came out and things looked better. It has dried off considerably but, depending on the soil, whether sandy or clay, many fields are yet too wet for operations. The Lockhart Field especially has a soil that makes roads impassable after heavy rains.

Medina County

Magnolia Petroleum Co. has bought, subject to final passing of papers, all the acreage in Medina County belonging to the Ira Oil Co. and west of the Hondo River in the P. E. Durst survey, amounting to about 320 acres. The price paid was $50,000. The acreage is in the Ina oil field that came to life in September when Eastham & Tarver brought in No. 1 Viola Wilson at 966 feet, which made an initial production on the pump around 100 bbls. daily. Magnolia already had 260 acres under lease in that part of the survey. The leases purchased by the Magnolia includes five producing wells. Details of the transaction are being closed up and Magnolia will probably take possession soon. That the sale had been agreed to was confirmed by officials of the Ina Oil Co.

Caldwell-Bastrop

Gulf Production Co. is practically ready to spud in on its No. 1 Canady in Caldwell County a half mile or more southeast of its No. 1 Magee which it recently abandoned in Caldwell County, a few miles southeast of the town of Lockhart. Reiter & Foster are about ready to spud in on their No. 1 Brown, a few miles northeast of the Magee test. These tests are south and east of Dale along a new line that the companies blocked out and began taking leases on nearly a year ago and along which considerable additional interest has arisen due to comparison of the logs of the recent tests seemingly proving the existence of the structure. These two tests will be watched with the keenest interest. The Gulf's new test is practically 7 miles due south from the Lytton Springs or Lockhart Field. Reiter-Foster's test is about 4 miles northeast of Gulf's test and is in the Charles M. Cannon survey. North & South, which has a small well on the Callahan farm, 2 miles south of the Gulf's well, producing from the Austin chalk, is understood to be arranging to start another test.

Two tests in Bastrop County attracting attention are the Knox and others' No. 1 Bat Lane, southwest of the town of Elgin in the north part of the county, which, at 2,284 feet, is not looking very encouraging and the Coyle-Concorn No. 1 Heywood, in the C. G. Smith survey, 7 miles southwest of the town of Bastrop, which, at 2,710 feet, is not very encouraging. Andrews Petroleum Co. is rigging up for No. 1 Brundage in the northern part of Bastrop County, a few miles east of the town of Elgin. It is an important test and will be watched with interest.

Carolina-Texas District

Operators are slow at resuming work in the Carolina-Texas district in Webb County. Due largely to the increased activity and drilling and also to disclosures that the gas field in the Carolina-Texas district is proving much more extensive than was first supposed there is a good demand for acreage. The first important sale in many months, since the time more than a year ago when the big companies bought heavily around the Carolina-Texas Field on a showing from one of the wells which afterward proved a disappointment, was made a few days ago and includes Surveys 702½, 2,082 and 674, in all 14,000 acres of which The Texas Co. got about 600, Magnolia about 600 and L. W. Stieren 200. It is a little over a mile from the nearest corner of the tract to the discovery Carolina-Texas gas well.

In the Edgington district south of the Aviator Pool in the Mirando district, Rydal Oil Corp. and Crown Central Oil Corp. which are jointly developing a lease are starting four rigs and will have them under headway within a few days. This is in the district where George M. Ball a few months ago gave the pool a new start towards the south towards the old Mirando Valley or discovery well of the district and to which Keene and others recently gave new impetus when he brought in the No. 1 Bruni, extending the field still farther south and some east. Many offsets are called for and drilling will be active. George M. Ball's No. 5 Edgington, on Block 73 of the Edgington subdivision of the Puig Brothers ranch in this district, which came in as a gasser some weeks ago, is now making oil, according to the superintendent of the lease reporting to the office. On that block the Nos. 1, 2, 3, 4, 5, 6, 7, 8, 10 and 12 are producing oil, No. 9 is drilling in, No. 11 is drilling at 600 feet and derricks are up for Nos. 13, 14 and 15, which will complete the drilling of the block. No. 4, which offsets the No. 5 gasser, has increased its production since No. 5 began making oil. On Block 74 Ball completed No. 1 some weeks ago and has derrick up for No. 4, which offsets the Keene oil well. Considerable additional drilling is about to get under way there in addition to that of the Rydal-Crown Central, Ball and Keene. O. W. Killam is arranging to drill three wells at once, Doctor Edgington is getting ready to drill an offset to the Keene well and J. M. Davis of San Antonio is arranging to drill.

Fayette County

O. W. Killam's No. 1 Koether in Fayette County, 6 miles north of Schulenberg is drilling at 950 feet and has had a showing of gas that blew the fluid out of the hole. E. Pierre Young, who has a block of 6,000 acres in Fayette, west and a little south of Schulenberg, spudded in a test the past week. A test 6 miles

(Continued on Page 200)

News from Fields of Canada

By Victor Lauriston

CHATHAM, Ont., Jan. 9.—Throughout western Canada, with a few exceptions, drilling operations have slowed down as the result of winter weather. The outlook for 1926, however, points to a season of more than usual activity—probably the most active since the Calgary boom, though this year the new prospecting activity will have the stimulus of some measure of real production.

There is every indication that the Turner Valley Field, southwest of Calgary, will be again, as in 1925, the great center of drilling activity in the Canadian West. In this field most of the deep tests now drilling are continuing work through the winter, and it is not improbable that before spring some completions will be reported.

The tests now drilling include the Vulcan Oils, Ltd.'s offset to Royalite's No. 4, which has already encountered some showings of light oil and is down more than 3,100 feet; the Royalite's Nos. 5 and 6, which still have around 1,000 to 1,200 feet to drill; the Big Chief Oil Co., Section 5-20-2w5, down around 1,800 feet and drilling; the MacLeod Oil Co., Section 1-20-3w5, which has apparently drilled to the first sand, and the Advance Oil Co., which is reported well under way. The Illinois-Alberta Oil & Refining Co., Section 12-20-3w5, is doing some work, and Dalhousie Oil Co.'s No. 3, Section 13-20-3w5, is being got in shape for deeper drilling. This test, which is being put down by the Imperial Oil, Ltd.'s new subsidiary in the Turner Valley Field, is a deepening of the Alberta Southern's No. 1, which has already been drilled to 3,080 feet and had a small light oil production.

The Royalite Oil Co.'s No. 4, which was put on the new 4-inch oil line to Calgary some time in November, is maintaining, and even slightly increasing, its production, which is around 500 bbls. a day of 73 gravity crude naphtha. If the drilling now in progress by the Royalite Oil Co., Dalhousie Oil Co., Vulcan Oils, Ltd. and other companies secures additional production in the Madison limestone, it will undoubtedly stimulate further work, not merely on close-in territory, but further afield.

Irma-Wainwright Field

Next to the Turner Valley Field, the most promising area judged by actual results seems to be the Irma-Wainwright Field, about 100 miles east of Edmonton. Here there are several tests, unfinished in 1925, which may be expected to continue work in 1926. British Petroleums, Ltd., which has already secured a heavy oil production in four wells, is expected to do additional drilling; though no locations have yet been reported. Interior Oil Co., Section 36-44-7w4, is finishing the old Wainwright Oil Producers Syndicate test close to Wainwright. Maple Leaf Oil & Gas Co. is reported to be arranging for a second test, having two years ago secured some gas and traces of heavy oil in No. 1, Section 24-45-8w4. The Anglo-Alberta Oil Co., Section 18-45-6w4, is to drill an offset to British Petroleums' No. 3-B. The Edmonton-Wainwright Oils Co. is moving drilling material from the British Petroleums' No. 3-B to a close-in location and has a derrick up. Frank Stevens has returned from his holidays in Texas to take charge of the drilling. There may be additional drilling undertaken in this area by other companies; practically all of the territory close in to the British Petroleums, Ltd., producers is tied up by various companies and syndicates.

In the border field, just north of the Kevin-Sunburst Field in Montana, results so far as crude oil are concerned have as yet been negative, though in 1925 the Montana drilling extended pro-

(Continued on Page 202)

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North Louisiana-Arkansas

By M. L. Vaughn

Production continues rapid decline due to slump in output of Smackover heavy. Wildcatters becoming active in various sections of Louisiana and Arkansas. Interesting test in Ashley County being drilled in hope of developing another big gas field. Suits filed to stop blowing of wells with natural gas.

SHREVEPORT, La., Jan. 11.—A steadily falling production in the heavy oil territory in Smackover has brought the production of this grade down to 153,690 bbls., having reached its height in June, 1925, when it was well over 400,000 bbls. a day. The decrease during the past week averaged 4,340 bbls. daily, with only slight variations in other districts, while North Louisiana production held its own and showed an increase of 98 bbls. a day. Total production averaged 228,366 bbls. daily, distributed as follows:

North Louisiana	
Bellevue	2,355
Caddo, light	8,805
Caddo, heavy	2,495
Cotton Valley	8,400
De Soto and Red River	3,805
Elm Grove	646
Haynesville	11,390
Homer	5,830
Urania	475
	44,201
Arkansas	
Smackover, heavy	153,690
Smackover, light	19,410
El Dorado	7,795
Nevada	1,545
Stephens	1,725
	184,165
Total both fields	228,366
Decrease	4,467

Interesting Wildcat

Among the wildcats now drilling in Arkansas is one of particular interest in Ashley County, north of the Monroe gas field. The well is being drilled by W. H. Rhodes and others on the Bledsoe land in Section 20-15-7, west of the center of the county and about 40 miles east of the Smackover Field.

Oil men are generally of the opinion that somewhere on the edge of the Monroe gas field will be developed a large gas field and a number of tests in the northwest corner of Ashley County have proved particularly promising. Geologists, agree that the Saline River is a fault line and the Bledsoe well is checking high, having gone through 1,150 feet of gumbo and after drilling through 7 feet of lime rock, getting a show of gas at 1,500 feet.

Several major companies have secured protective acreage around the Bledsoe well, which is on a block of 6,000 acres, and all are keeping a close check on this development.

A determined effort to stop the blowing of wells in the Arkansas field by gas has resulted in the filing of five suits for injunctions by representatives of the State Conservation and Inspection Department. Temporary restraining orders were asked against the Lion Oil Refining Co., the Natural Gas & Fuel Corp., the Unity Petroleum Co., Woodley Petroleum Co. and the Maagar Producing Co.

At a special hearing, attorneys for the defendants asked that no injunctions be issued until a regular trial could be held. It was stated by the oil companies' representative that "the issuance of a temporary blanket injunction at this time would ruin the field, that it would cut the oil production from 50,000 to 100,000 bbls. a day and would permanently cripple the industry," and "that to shut down the wells now being blown by natural gas would allow salt water to flood the producing sands and practically ruin the wells."

After long debate, the hearing was set for January 18 and answers to the injunction suits may be filed before that date by companies who wish to contest the proceedings.

Miller County Test

Buzzards Bluff Oil Co., organized by W. B. Nash of Texarkana, has derrick up for a test on the Gillespie land in Section 22-14-16, at the east end of Buzzards Bluff on Red River, in Miller County. E. B. Guess, who has the contract for drilling the well, has drilled several in this territory in which he has had promising showings of oil and gas.

A wildcat test drilling by the Sid Simmons Drilling Co., of Monroe, for Potts & Prickett, ran into a promising looking sand at 1,347 feet, and 6-inch casing is being set for a test. The well is located in Section 30-12-2e, in Caldwell Parish, 18 miles northeast of the Urania Pool, and the sand was found approximately 125 feet higher than in Urania.

Two interesting tests are being started in the Bellevue Field, Bossier Parish, the shallow sand territory in which there has been very little activity during the past year. J. M. Hamby, has spudded in for a test on the Larkin-Henderson land in Section 14-19-11, 300 feet south of a well drilled about a year ago by the Standard Oil Co., which looked like a commercial well, but only lasted a short time. Another test will be drilled on the Connell lease in Section 27-19-11, 2 miles south of the west edge of Bellevue production.

The Amerada Petroleum Corp. encountered a good showing of gas in a wildcat well in Section 3-11-8, in Natchitoches Parish, near the Red River Parish line, 8 miles north of Campti. The blowout was at 1,500 feet and of sufficient force to throw mud and debris over the derrick.

Completions. Union County, Arkansas

An unusual number of failures were reported from the Union County area during the week, most of them in the East El Dorado and Norphlet Districts. Of 20 completions, 12 were failures, with one gas well and seven oil wells having an aggregate initial production of 1,010 bbls.

In the East El Dorado District, Braswell and others abandoned No. 1 Doss, Section 16-17-14, at 2,168 feet.

Dobbs and others abandoned No. 1 Kelly, Section 9-17-14, at 30 feet.

Norris and others abandoned No. 1 Perdue, Section 4-17-14, at 2,050 feet.

Wingfield and others got salt water and abandoned No. 1 Tuffs, Section 18-17-14, at 2,853 feet.

Zoder and others abandoned No. 5 Allen, Section 18-17-14, at 2,981 feet.

In the Norphlet and Smackover fields, Fitzwater and others got salt water and abandoned No. 1 Saxon, Section 16-16-16, at 1,979 feet.

F. C. Henderson abandoned No. 2 Smith, Section 18-16-15, at 2,737 feet.

E. M. Jones junked the hole and abandoned No. 2 Lawton, Section 10-16-15, at 2,617 feet.

Lion Oil & Refining Co. got salt water and abandoned Murphy A-10, Section 7-16-15, at 2,422 feet.

Phillips Petroleum Co. got salt water and abandoned No. 5 Alphin, Section 11-16-15, at 2,657 feet.

Sun Oil Co. abandoned No. 6 Hatfield, Section 6-16-15, at 2,431 feet and No. 18 Hays, Section 3-16-15, at 2,591 feet.

The best producing well of the week was Daniels & Rowe's Tatum A-1, Section 7-16-15, flowing 500 bbls. at 2,564 feet.

Ferguson Drilling Co.'s No. 1 Howard, Section 7-16-16, made a 30-bbl. pumper at 2,647 feet.

E. M. Jones completed No. 5 Cook, Section 16-16-15, flowing 150 bbls. at 2,479 feet; No. 1 Murphy, Section 17-16-15, 150 bbls. at 2,678 feet and No. 3 Murphy, same section, 50 bbls. at 2,531 feet.

Lion Oil & Refining Co.'s Murphy A-12, Section 7-16-15, is pumping 100 bbls. at 2,592 feet.

Magnolia Petroleum Co.'s No. 3 M. J. Scott, Section 12-16-17, is pumping 30 bbls. at 2,265 feet.

Marine Oil Co. completed Murphy B-5, Section 15-16-15, making 30,000,000 feet of gas at 2,707 feet.

Ouachita County

The Magnolia Petroleum Co. completed No. 11 Goodwin, Section 5-16-15, pumping 160 bbls. at 2,358 feet.

J. D. Reynolds junked the hole and abandoned No. 1 Smith, Section 13-15-17, at 2,257 feet.

Sam Richardson completed No. 3 Rhoten, Section 32-15-15, flowing 150 bbls. at 2,590 feet.

Caddo Parish

In the Hosston District, the Dixie Oil Co. completed No. 1 Donovan, Section 21-22-15, pumping 8 bbls. at 1,057 feet.

In the Pine Island District, the Fortuna Oil Co. completed No. 20 Raines, Section 22-21-15, pumping 2 bbls. at 1,620 feet. D. C. Richardson completed No. 1 Youree-Randolph, Section 13-20-15, making 15,000,000 feet of gas at 2,258 feet, and extending the Pine Island District 3 miles southeast.

The Texas Co. completed No. 6 Herold, Section 14-21-15, pumping 70 bbls. at 1,645 feet.

The Fortuna Oil Co. abandoned its test on the Mitchell lease in 17-18-16, 4 miles west of Cross Lake and 10 miles south of the Mooringsport District, at 4,329 feet.

Haynes Bros. went into salt water at 2,389 feet and abandoned No. 2 Louisiana Live Stock & Planting Co., Section 4-19-16, in the south end of the Morringsport District.

La Salle Parish

In the Urania District, Zeigen and others completed No. 1 King, Section 13-10-1e, flowing 25 bbls., 5 per cent salt water and 9 per cent b. s., at 1,534 feet.

Morehouse Parish

In the Monroe gas field, the United Carbon Co. completed No. 1 Grey, Section 19-20-5, making 4,000,000 feet of gas at 2,302 feet.

Ouachita Parish

In the Monroe gas field, the Palmer Corp. completed No. 1 K. Cole, Section 36-20-4e, making 8,000,000 feet of gas at 2,175 feet.

Webster Parish

In the Cotton Valley District, the Woodley Petroleum Co. completed Gray B-3, Section 23-21-10, pumping 45 bbls. at 2,556 feet, 20 per cent salt water.

Calhoun County, Arkansas

The Gulf Refining Co. got salt water in No. 1 Freeman Smith Lumber Co., Section 31-15-13, and the test was abandoned at 2,865 feet.

Miller County

The Humble Oil & Refining Co. abandoned No. 1 Edwards, Section 26-17-28, at 1,649 feet.

Union County—Drilling

A general cleaning up in the Union County area, including the abandonment of 12 old holes which had been hopelessly junked or tested dry repeatedly, starts out the year with a comparatively clear record, with 80 drilling wells, 12 rigs and 10 derricks, 8 arranging to pump and only 2 closed down.

The most interesting development in Union County is in the neighborhood of the Keisker well, which has extended the El Dorado Field 3 miles northwest of previous production and started a lot of activity in this locality. Howell & Knowles are down 2,145 feet in No. 1 Springer, Section 36-17-16; E. M. Jones, drilling at 2,200 feet in No. 1 J. R. Dumas, Section 8-17-16; Miles, trustee, rigging up to drill No. 1 Miller, Section 35-17-16; Owens and others drilling at 1,550 feet in No. 1 Porter, Section 4-17-16, and at 1,150 feet in No. 1 Parks, Section 32-16-16; J. D. Reynolds drilling at 2,150 feet in No. 1 Dumas, Section 15-17-16; Rovenger Oil Corp. drilling at 1,000 feet in No. 1 Dumas, Section 9-17-16, and Wingfield and others rigging up to drill No. 1 Dumas, and derrick up for No. 2 in Section 9-17-16.

In the old field, C. H. Allison is rigging up to drill No. A-1 Fitzgerald, Section 17-18-15; Anderson and others drilling at 2,300 feet No. 2 Murphy, Section 15-16-15; Arkansas Drilling Co. set 6-inch at 2,255 feet in No. 2 Turnage, Section 34-15-16; Broderick & Calvert reaming to bottom of hole at 2,580 feet in No. 4 Bradford, Section 8-16-15; Sam Cook is down 2,400 feet in No. 7 and No. 8 Tatum, Section 7-16-15, and is arranging to deepen No. 3 in the same section.

Crawford & Sebastian tested salt water with a show of gas at 2,555 feet in No. 10 James, Section 8-16-15, and is recementing casing; J. E. Crosbie is arranging to deepen No. A-1 Lawton, Section 10-16-15, formerly abandoned at 2,350 feet; Crown Central Petroleum Corp. set 8-inch at 2,510 feet in No. 7 Murphy, Section 8-16-15; Estes and others arranging to deepen No. 1 Murphy, Section 15-16-15, formerly flowing 1,500 bbls. and went to salt water at 2,465 feet.

Gulf Refining Co. has 500 feet of fluid in the hole in No. 8 Graves, Section 3-16-15, 20 per cent salt water, in 6 feet of sand at 2,555 feet, and is arranging to pump; recementing casing at 2,580 feet in No. 5 Primm, Section 1-16-16; has 800 feet of oil in the hole in No. 44 Werner, and rigging up to drill No. 45, Section 6-16-16; Harrell, trustee, testing 6 feet of broken sand at 2,310 feet in No. 1 Carroll, Section 7-16-16; Hickman and others drilling at 2,290 feet in No. 12 Graves, Section 3-16-15; Hollifield and others tested salt water at 2,560 feet in No. 3-A Giller, Section 10-16-15, and is arranging to set a short string of 3½-inch casing.

Humble Oil & Refining Co. drilling at 2,550 feet in No. 5 Giller, Section 15-16-15; E. M. Jones rigging up to drill No. 7 Murphy, Section 17-16-15, and drilling at 2,100 feet in No. 3 Lawton, Section 10-16-15; Kennebrew and others tested salt water at 2,548 feet in No. 1 Williams, Section 3-16-15, and is plugging back to test at 2,541 feet; W. R. Keever drilling No. 4 Sanford, Section 17-16-15, at 2,460 feet; Laurel Oil & Gas Co. lost the hole at 2,100 feet in No. 5 Tatum, Section 7-16-15, and is down 50 feet in second hole.

Liberty Oil Co. is coring at 2,165 feet in No. 2 Davis, Section 31-16-14, a test 3 miles southeast of Norphlet and 3 miles northeast of El Dorado.

Lion Oil & Refining Co. coring No. 9 Graves, Section 3-16-15, at 2,565 feet and drilling at 2,355 feet in No. 10, same section; drilling No. A-13 Murphy, Section 7-16-15, at 2,415 feet; set 6-inch at 2,495 feet in No. C-10, same section; drilling No. D-6, Section 8-6-15, at 2,200 feet, and No. G-6, same section, at 350

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COLLAPSING TESTS

Mark and Description	Collapsing Pressure
Lab. No. 76160—Specimen No. 1, 10"—45 lb. per ft. Lap-welded oil well casing, 10¾" dia. by 58¼" long	2350 lbs. /sq. in.
Nature of failure—Center portion of specimen was distorted to an ellipse. The dimensions at greatest distortion are 9¾"x11½"—at a point 30" from the welded end.	
Lab. No. 76161—Specimen No. 2, 10"—41 lbs. per ft. American Seamless Casing made under the Mannesmann Process, 10¾" dia. by 58¾" long	2450 lbs. /sq. in.
Nature of failure—Center portion of specimen was distorted to an ellipse. The dimensions at greatest distortion are 9⅞"x11" at a point 32" from the welded end.	
Lab. No. 76162—Specimen No. 3. American Seamless Casing, same description as No. 2, 10¾" dia. by 58½" long	2575 lbs. /sq. in.
Nature of failure—Center portion of specimen was distorted to a heart shape. The dimensions at greatest distortion are 9¼"x11¼" at a point 23" from the welded end.	
Lab. No. 76163—Specimen No. 4, American Seamless Casing, same description as No. 2, 10¾" dia. by 58¾" long	2535 lbs. /sq. in.
Nature of failure—Center portion was distorted to an ellipse. There were two points of failure, making a flattened portion on the end of the ellipse. The dimensions at greatest distortion are 10"x11½".	

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feet. Little Fay Oil Co. has a fishing job at 2,615 feet in No. 5 Harrell, Section 17-16-15, and Magnolia Petroleum Co. drilling No. 3 Hatfield, Section 7-16-15, at 1,700 feet, and No. 2 R. O. Scott, Section 12-16-17, at 2,075 feet.

Murdock and others drilling No. 7 Vestal, Section 17-16-15, at 1,000 feet, and No. 8, same section, at 2,250 feet. Natural Gas & Petroleum Co. drilling No. A-3 Harrell, Section 17-16-15, at 2,550 feet; No. 5 Ballard, Section 15-16-15, at 2,585 feet; No. 4 Flenniken, Section 8-16-15, at 150 feet; Murphy, Section 17-16-15, has 1,500 feet of oil in 10 feet of sand and is arranging to pump at 2,692 feet and No. A-5 Murphy, same section, is rigging up to drill.

Pure Oil Co. set 12½-inch casing at 300 feet in No. 8 Merriwether, Section 6-16-15; Russell and others tested 1 foot of sand with promising indications in No. 1 Brown, Section 8-17-14, and has set a short string of 4-inch at 2,809 feet, an interesting test in the deep sand territory in the East El Dorado Field. Simms Oil Co. is reaming back to 2,447 feet in No. A-1 Murphy, Section 16-16-15; Southern Crude Oil Producing Co. has 800 feet of fluid in the hole in 1 foot of sand at 2,360 feet in No. 7 Lyell, Section 3-16-15, and is arranging to pump; bailing to test 2 feet of sand at 2,651 feet in No. 3 Lawton, Section 7-16-15; drilling at 1,280 feet in No. 4 Lawton, and derrick up for No. 5, same section.

Sun Oil Co. is coring No. 1 McClannahan, Section 1-16-16, at 2,643 feet; The Texas Co. recementing casing at 2,504 feet in No. 9 Alphin, Section 3-16-15; bailing to test 21 feet of broken sand at 2,570 feet in No. 10, and bailing to test 27 feet of broken sand at 2,554 feet in No. 11 Alphin, same section. Thurman and others rigging up to drill No. 1 Flenniken, Section 17-16-15, swabbing 10 feet of sand at 2,568 feet in No. 9 Wilson, Section 6-16-15, and arranging to pump No. 1 Tatum, Section 7-16-15, at 2,398 feet. Wingfield and others are trying to cement two joints of 4½-inch at 2,853 feet in No. 3 Lyons, Section 7-17-14.

Ouachita County

Operations in Ouachita County have dwindled down to 32 drilling wells, 2 rigs and 4 derricks and there are no indications of increased activity in the near future.

Gulf Refining Co. is down 2,685 feet in No. R-8 Bennett, Section 33-15-15, an old well being deepened; Houston Oil Co. drilling at 2,355 feet in No. 7 Hinton, Section 5-16-15; Howell and others bailing to test 10 feet of sand at 2,385 feet in No. 5 Williams, Section 3-16-15; Humble Oil & Refining Co. arranging to pump No. B-8 Arnold, Section 26-15-16, now standing with 200 feet of oil in 29 feet of broken sand at 2,029 feet, rigging up to drill No. B-9 Arnold, same section; drilling No. 9 Flannigan, Section 6-16-15, at 1,150 feet; drilling No. 6 Laney, Section 31-15-15, at 1,850 feet; tested salt water at 2,592 feet and coring at 2,597 feet in No. 4 H. Laney, Section 21-15-15, and tested salt water and recementing casing at 2,348 feet in No. 6 Jones-Umsted, Section 4-16-15.

Imperial Oil & Gas Producing Co. drilling No. 9 McClannahan, Section 6-16-15, at 2,492 feet; Kouri and others set 4½-inch at 2,630 feet and drilling at 2,640 feet in No. 2 Snowhill Church, Section 28-15-15; Magnolia Petroleum Co. arranging to deepen No. 2 Bettie Clawson, Section 5-15-17, and No. 9 J. Goodwin, Section 5-16-15, drilling No. 10 J. Goodwin, same section, at 2,325 feet; A. Meek drilling No. 1 Lagrone, Section 36-15-17, at 1,250 feet; Ohio Oil Co. has derrick up for No. 18 Cramer, Section 27-15-16, and set 6-inch at 2,000 feet in No. B-9 Lewis, Section 26-15-16; Pure Oil Co. drilling in shale at 2,610 feet in No. 1 Stout Lumber Co., Section 27-15-18; Simms Oil Co. testing casing at 2,100 feet in No. 5 Hildebrandt, Section 28-15-15, and drilling at 1,415 feet in No. 8 N. B. Murphy, Section 29-15-15.

Standard Oil Co. arranging to test second sand in No. 9 J. Griffin, Section 33-15-15, at 2,383 feet, and arranging to test at 1,950 feet in No. 7 Umsted, Section 32-15-15; Superior Oil Co. set 6-inch at 2,560 feet in No. 3 Flannigan, and drilling at 1,000 feet in No. 4, Section 6-16-15, and Woodley Petroleum Co. sidetracking drill stem at 1,965 feet in No. 1 Umsted, Section 4-16-15, and rigging up to drill No. 4 Richardson, Section 29-15-15.

Vandiver and others are drilling at 1,550 feet in No. 1 Yarbrough, Section 22-14-17, a test 7 miles northwest of Louann and 5 miles south of Camden.

Bienville Parish

Hawks and others are drilling in rock salt at 1,239 feet in No. 1 Calhoun, Section 15-19-7, 8 miles south of Homer and 5 miles north of Gibbsland.

Bossier Parish

Arkansas Fuel Oil Co. has shut down for fuel at 991 feet in No. 1 Murray, Section 14-23-14, 8 miles northwest of Plain Dealing.

Square Deal Oil Co. is waiting for 6-inch casing at 1,210 feet in No. 1 Hall & Rumbough, Section 17-18-11, 2 miles northwest of Haughton.

Simms Oil Co. is building derrick at 580 feet, after pulling in in No. 1 C. D. Sandidge, Section 9-18-11, 2 miles north of Haughton.

Bellevue Field

G. W. Wetherbee is drilling at 275 feet in No. 3 Berle, Section 24-19-11.

Caddo Parish

In the Pine Island district, Dixie Oil Co. is drilling at 2,889 feet in No. B-2 Noel, Section 13-21-15; Double I Oil Co. set 10-inch at 80 feet in No. 5 Spell, Section 15-21-15; Fortuna Oil Co. is waiting for standard rig to pump at 1,758 feet in No. A-7 Hampton, Section 15-21-15; bailing at 2,314 feet in No. 1 Spell, Section 29-21-15; O'Dell & Lawton are fishing for drill stem at 1,200 feet in No. 6 Huckaby, Section 15-21-15; Ohio Oil Co. has drill stem stuck at 3,665 feet in No. 1 J. B. Ardis, Section 1-21-15; is running core at 3,315 feet in No. 18 E. K. Smith, Section 12-21-15, and The Texas Co. set 5-inch at 1,420 feet, down 1,624 feet in No. 46 Caddo Mineral Land Co., Section 23-21-15.

In the Hosston district, Dixie Oil Co. is drilling at 3,728 feet in No. 1 Jolly, Section 27-22-15.

In the Oil City district, Bratcher and others are drilling at 1,975 feet in No. 1 Files, Section 10-20-16; Gulf Refining Co. is waiting for standing rig to pump at 2,287 feet in No. 223 Ferry Lake, Section 16-20-16; drilling at 1,710 feet in No. 224 Ferry Lake, Section 20-20-16; rigging up to drill No. 225 Ferry Lake, Section 21-20-16.

In the old Caddo Field, Standard Oil Co. cored from 2,323 feet to 2,325 feet broken sand rock at 2,325 feet in No. 175 Stiles, Section 27-21-16.

Ridge Oil Corp. is rigging up to drill No. 1 Duke Williams, Section 3-15-15, 3 miles southwest of Keithville.

Caldwell Parish

Potts & Crickett, trustees, set 6-inch and are waiting orders at 1,448 feet in No. 1 Core, Section 30-12-3e, half way between Columbia and the Urania Field.

Claiborne Parish

J. P. Evans and others are drilling in shale and boulders at 1,988 feet in No. 1 Mrs. P. L. Boatner, Section 10-19-5, 7 miles north and a little east of Arcadia.

Standard Oil Co. is waiting standard rig to pump at 1,338 feet in No. 33 Lawenberg, Section 24-21-8.

Catahoula Parish

The Texas Co. is drilling in shale at 280 feet in No. 1 Harris Hyman, Section 24-8n-3e.

DeSoto Parish

In the Naborton Field, the Dixie Oil Co. set 8-inch at 3,293 feet in No. 1 Jenkins, Section 9-12-11, and the Gulf Refining Co. is drilling at 760 feet in No. A-34 Jenkins, Section 2-12-12.

Gulf Refining Co. is drilling in lime at 5,883 feet in No. C-18 Willis Williams, Section 31-13-11, 2 miles south of Bayou Pierre Lake.

Five miles southeast of Logansport the Fortuna Oil Co. is arranging to abandon No. 1 Alexandria, Section 32-12-15, at 4,223 feet and is building derrick for No. 1 Bond, Section 27-12-11.

LaSalle Parish

Alexandria Urania Oil Co. is drilling at 1,360 feet in No. 2 Urania, Section 19-10-2e, and Ayers and others are drilling at 1,526 feet in No. 2 Urania, Section 13-10-1e, 2 miles west of Urania.

Ab Jones is down 400 feet in No. 1 Rusell, Section 24-10-1e, formerly reported as Davis & Meridith's No. 1 Russell, 2 miles east of Urania.

Dixie Oil Co. set 10-inch at 63 feet in No. 2 Urania, Section 24-10-1e, 8 miles west of Jena, and Goulf & Monroe Drilling Co. are down 1,300 feet in their No. 1 Tullos, Section 23-10-1e. Keene & Woolf Oil Co. are drilling at 1,300 feet in No. 2 Urania, Section 19-10-2e. Louisiana Oil & Refining Co. set 10-inch at 80 feet in No. 3 Tremont, Section 30-10-1e.

Natural Gas & Petroleum Co. is rigging up to drill No. 2 Tullos, Section 25-10-1e, and No. 2 Urania, Section 24-10-1e. Ohio Oil Co. set 6-inch at 1,573 feet in No. 1 Urania, Section 24-10-1e.

Morehouse Parish

R. C. Boisseau and others are running core at 2,411 feet in No. 1 Sullivan, Section 11-21-7e, 10 miles east and a little north of Bastrop.

Natchitoches Parish

Amerada Petroleum Corp. is waiting orders at 1,532 feet, showing a few gas bubbles, in No. 1 Wafer, Section 3-11-8.

Lincoln Parish

Buckley & Palmer have derrick up for No. 1 Davis, Section 12-20-3w.

Ouachita Parish

Southern Carbon Co. set 8-inch casing at 860 feet in No. 47 Fee, Section 35-19-4e.

Union Parish

Empire Gas & Fuel Co. is rigging up to drill No. 1 Dubach, Section 17-20-1e; Arkansas Fuel Oil Co. set 12-inch at 199 feet in No. 1 Reeves, Section 14-20-1e; Natural Gas & Producing Co. is drilling at 2,108 feet in No. 1 Scott, Section 8-20-4e.

Winn Parish

J. H. Hall is drilling at 836 feet in No. 1 Eagles, Section 6-10-2w, 3 miles south of Winnfield.

Cotton Valley District

Alabama Petroleum Co. has derrick up for No. A-3 Robins, Section 21-21-10, and will drop Nos. A-4 and B-2 Pardee, Section 24-21-10, from report.

Fortuna Oil Co. is drilling at 4,049 feet in No. 1 Bible, Section 8-20-9; Gulf Refining Co. is drilling at 1,840 feet in No. 1 R. H. Coyle, Section 15-21-10; drilling at 1,995 feet in No. 1 Marshall, Section 21-21-10.

Humble Oil & Refining Co. is milling out junk at 3,950 feet in No. 1 R. R. Cox, Section 22-21-10.

R. W. Morton is drilling in sandy shale at 2,615 feet in No. 1 Josey & Massey, Section 27-21-10.

Ohio Oil Co. set 10-inch at 305 feet in No. 2 Riggins Cox, Section 15-21-10; drilling in lime at 3,000 feet in No. 1 W. Cox, Section 23-21-10; drilling in lime at 1,700 feet in No. 21 Gray, Section 26-21-10; drilling in hard shale at 3,677 feet in No. 1 A. J. Hodges, Section 23-21-10; blowing to test in 23 feet of sand at 2,593 feet in No. 1 W. E. Hodges, Section 15-21-10; waiting standard rig to pump in 400 feet of oil and

(Continued on Page 207)

Rocky Mountain Area

By F. B. Taylor

CASPER, Wyo., Jan. 9.—The Argo Oil Co.'s headquarters at Casper will be moved to Denver at once, only a field force of two or three men to be kept at Casper. The reason given is the high cost of living at Casper and the accessibility of Denver from the different fields and operations of the Argo Oil Co.

The Argo Oil Co. is the result of a merger of a number of smaller firms operating in the Wyoming and Colorado fields. The Glenrock and Hall oil companies controlled the Pilot Butte Field in Fremont County, the Glenrock, Marine and Royalty and Producers companies had producing holdings in Salt Creek Field and also some leases in Lance Creek. The Western States Oil & Land Co. had some production in Salt Creek and also controlled the Soap Creek Field in Montana, a black oil field.

Max W. Ball brought all these companies under one management and control and the result was the Argo Oil Co. The new firm has been making its headquarters at Casper, but as Mr. Ball lives in Denver, it is considered this is a main factor in moving the firm's headquarters to Denver.

Wildcat in Weston County

Near Upton, in Weston County, Section 35-48-64, northwest of the Osage Field, in northeastern Wyoming, the Pump Creek Oil & Gas Co. has made a location for a wildcat on an untested structure. This location is on the edge of the Black Hills uplift and a reverse dip appears to show a closed structure. However, the Dakota formation surfaces and this means that the production, if any, would be found in the Sundance or lower sands. In that case it is almost certain to be black oil. The Sundance sand will be found about 800 feet.

Strike Near Fort Washakie

The Wyoming Oil Syndicate, a firm composed mainly of Riverton and Denver men, has made a strike on the Shoshone Indian Reservation, Fremont County, near Fort Washakie, that may be the opening of a new field of black oil. This wildcat is located on Section 24-1-1 and the well starts at the surface below the Sundance formation. The Tensleep sand was drilled through and found water bearing and the Amsden sand encountered at 1,812 feet with a considerable showing of oil. As soon as the oil started to come up, drilling was stopped. The well was carrying all the Tensleep water at the time and the hole will be underreamed and the casing set to shut off the Tensleep water before drilling into the Amsden sand. This is the first well to make a test of the Amsden formation in that part of the country, although this sand produces black oil in other parts of Wyoming and Montana.

The Sundance sand surfaces at Fort Washakie and for many years has had a seep of black oil that was at one time used by the Indians as a medicine and for anointing the legs of their ponies in the belief that it enabled the animals to travel better. Later when the Government troops were stationed at Fort Washakie, and during later years, a small boiler plate still was placed and some efforts made to refine the oil. The crude produced kerosene for the Fort but it has a very small content of gasoline. There is a well defined structure at Fort Washakie, but the upthrust that formed it was so great that all the upper sands were surfaced and eroded so that the surface now is down in the Carboniferous. Fort Washakie lies about 20 miles west of Pilot Butte Field and between that field and the Hudson Field at Lander.

The Texas Co. recently purchased the half interest in the holdings of the Sheridan Wyoming Oil Co. in the Maverick Springs Field north of Riverton. Under an agreement between the two companies The Texas Co. will drill and operate the property, although there is no pipe line to market the crude now. The Texas Co. has started building a permanent camp in the field and will begin drilling in a month or so. The permanent camp will have an office building, boarding house and bunkhouse for the single workers and there will also be smaller places for the men with families.

The Wilson Dome well of the Marland Oil Co., drilling on Section 32 38-83, about 35 miles west of Casper, is drilling into Lakota sand at 1 760 feet. After a second trial the casing was found tight and the well cleaned of water. The first try at cementing off the water found in the Dakota was a failure.

Plug Colorado Well

On the Iles Dome in Colorado, south of the Moffat Field, Moffat County, the

(Continued on Page 221)

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Kentucky—Tennessee

By Vern T. Whitney

Wilcox Brothers complete 50-bbl. well, Sulphur Creek, Cumberland County, opening new area. Wood Haislet and others' well, Crocus Creek, Southern Adair County, flows 500 bbls.; A. H. Heisey Co.'s Robbins well, Overton County, Tennessee, 50 bbls. Third pay in Midkiff Pool.

BOWLING GREEN, Ky., Jan. 11.—The most important feature of the week in the Kentucky-Tennessee fields was the bringing in of the second well on the Melton farm at the head of Williams Prong of Sulphur Creek, Cumberland County. It came in flowing at the rate of 50 bbls. daily from the First Sunnybrook sand at an approximate depth of 362 feet, and serves to prove that a new prospective area has been opened. No. 1 Melton, finished last October for 25 bbls., in the Upper Sunnybrook sand at 365 feet, extended production a mile and a half east of the Kettle Creek wells, and a mile north of the Raydure Pool in the Sulphur Creek area. The Melton lease is owned by Wilcox Bros. of Cleveland, Ohio. Several leases have changed hands in the vicinity of the Melton farm and two rigs are being moved to locations close to the discovery well.

The G. W. Brockman test, a mile north of Hopwell Church, in the Crocus Creek section of southern Adair County, being drilled by Wood-Haislett, McLennon & Calhoun, is reported flowing 500 bbls. of 46 gravity oil at 245 feet, 10 feet in the Upper Sunnybrook sand. It is an offset to the Garrett gusher drilled in 1868. A. H. Heisey & Co.'s Robbins test 4 miles east of Livingston, Overton County, Tenn., is reported good for 50 bbls. in the Trenton sand at 1,800 feet.

Find Third Pay

In the Midkiff Pool, in the Owensboro District, the White Plains Oil & Gas Co.'s initial venture on the John Ward farm, a mile north of the discovery well on the Midkiff place, is showing for a 5-bbl. pumper in the Jett sand. The Barlow formation, below the Jett, where the Midkiff is producing, was dry and the hole was plugged back to the Jett. This makes three pay sands found to date in this new pool,—the Barlow being productive in the Midkiff, the Jett in the John Ward and the Stray sand, above the Jett in the W. P. Griffith.

A semi-wildcat drilled by Frank Cooksey on the Haden farm, a half-mile east of production in the Stone Quarry District of western Warren County, failed to show commercial production, and was abandoned at 1,050 feet, 90 feet below the black shale.

Nothing of interest is reported from the Standard Oil Co. of Kentucky's test near London in Laurel County. The venture which was reported with an excellent oil showing at 710 feet is still shut down.

Near Dripping Rock in the northern part of Jackson County, near the Lee and Estill County lines, quite a leasing campaign is taking place. Among some of the larger companies invading this territory are the Standard Oil Co. of Kentucky and the Eastern Gulf Oil Corp., The Fowler Bros. Petroleum Co., has drilled several wells in this neighborhood that showed for small producers in the famous Irvine sand at about 600 feet in depth. Some acreage is also being taken up near Island City, south of the Idamay Field of Lee and Owsley Counties. A half dozen wells drilled in this section showed paying production from the Big Indian formation.

Week's Work

Twenty-five completions, 11 failures, one gas well and 13 producing wells with a combined flush production of 128 bbls., was the record of the week in the Kentucky Field. This was a decline of six producers and a drop of 95 bbls. in initial yield, compared with the preceding week, when there were 31 completions, including nine failures, and 22 producers, with a combined production of 223 bbls. The wells were distributed by counties as follows

County—	Comp.	Wells	Prod.	Dry	Gas
Barren	6	2	11	4	0
Owensboro District	4	2	10	2	0
Johnson-Magoffin	3	3	20	0	0
Lawrence-Johnson	2	2	32	0	0
Floyd	2	0	0	1	1
Yayne	2	0	0	2	0
Warren	2	0	0	2	0
Cumberland	1	1	50	0	0
Allen	1	1	3	0	0
Estill	1	1	2	0	0
Total	25	12	128	11	1
Last Week	31	22	223	9	0
Difference	6	9	95	2	1

Eastern Division

The best well of the week in eastern Kentucky was the Union Gas & Oil Co.'s No. 26 Sanford Lyon, in District No. 22-A, of the North Weir Field, Lawrence and Johnson Counties, which started off at better than 20 bbls. at an approximate depth of 890 feet. In District No. 22, of the same field, Wm. Stone and others' No. 9 Ira Lester is an 8-bbl. pumper from the Weir sand, and Garrison & Townsend's No. 2 I. M. Hay, District No. 22, made 4 bbls. on jack from the Weir sand.

South Weir Field

The South Weir Field, comprised of parts of Johnson and Magoffin Counties, showed three completions, all producers.

In District No. 29, R. G. Gillespie brought in his fifth producer on the Mary Burke farm, reported good for 7 bbls. from the Weir sand.

In District No. 31, the Bed Rock Petroleum Co.'s No. 3 on the W. E. Patrick tract showed for 5 bbls. in the Weir sand. In the same section, J. H. Arnett's No. 12 on his own place, made 20 bbls. flush and settled to 8 bbls. It was finished in the Weir sand.

Floyd County

The Ohio Fuel Oil Co.'s second venture of the Mousie Martin place in Left Beaver Creek, in District No. 21 of the famous Floyd County gas field, was reported dry and abandoned on the Maxon sand at 1,600 feet. In the same section, Distell-Martin and others got a gasser good for about 250,000 cubic feet from the Maxon sand at 1,592 feet.

Wayne County

The Beaver sand Field, Wayne County, showed nothing of interest, there being but two completions, both dry. In District No. 13, Bertram & Marsh's No. 1 John Reis, and B. S. Huffaker's No. 3 fee, in District No. 2, were dry and plugged in the Beaver sand.

Estill Counti

On the J. B. Rogers farm in District No. 7, of the Estill County oil field, the Mountain Springs Oil Co.'s No. 10 is a 2-bbl. stripper in the famous shallow Irvine sand.

Western Division

Dry holes ruled the week in the western end of the Blue Grass State, as out of a total of 14 completions only six were oilers with a flush of 74 bbls. The Melton well drilled by Wilcox Bros., on Williams Prong of Sulphur Creek, made 50 bbls., leaving the other five producers making but 24 bbls. together.

The new well of Wilcox Bros. on the Melton farm, Cumberland County, has added impetus to that district and already several rigs are being moved to drill locations made near by. This well is between the Sulphur Creek Anticline and the Meshack Uplift, on the south flank of Raft Creek Dome.

At Kettle Creek, the McClintock Oil Co.'s No. 6 Millard Kerr is down 750 feet and drilling. No. 10 is a location. Charles A. Gartland's No. 6 Maude Blythe was drilling at 125 feet, and No. 7 is being rigged up; the Watagа Petroleum Co.'s No. 2 Cain was going ahead at 75 feet, and Bonmell Zook and others' No. 2 Luther Blythe is drilling below 100 feet.

In the Sulphur Creek Pool, McClintock, Reid & Heckathorne are drilling No. 1 Hughes, at Pulsey Creek, to the same horizon that No. 2 is producing from. As soon as this has been done No. 3 Hughes will be commenced; W. S. Raydure's No. 10 J. Riddle is still being cleaned.

The Alta Oil Co. is putting its wells on the Cheatham farms at Crocus Creek on the pump as, according to reports, they have quit flowing. The Cheatham wells caused considerable excitement in the north end of Cumberland County during the latter part of 1925 and caused many operators to acquire acreage in the neighborhood of them.

On Steel's Fork of Bear Creek, Wilcox Bros. are progressing at 300 feet on their No. 6 Sarah Sheckles; Freeman & McCormick's No. 8 T. L. Bow is on top of the second Sunnybrook sand at 490 feet.

At Bear Creek, the McClintock Oil Co.'s No. 10 C. C. Smith is progressing at 123 feet.

It is freely predicted that Cumberland County will get a big play this year and that the county will show more new production than any other in the state.

Barren County

Barren County had a bad week, in fact its worst in many a day. Out of a total of six completions only two made producers. Drilling is falling off in this section due partly to the holiday season.

The Emery-Moore Pool supplied the two producing wells. They were Fred Moore's No. 12 McCubbin good for 6 bbls. at 185 feet below the shale, and Ziegler Bros.' No. 11 Drennon, good for 5 bbls. at 487 feet, 183 feet below the shale.

In the Gorby Pool, L. J. Emory, Jr. & Sons' No. 3 Richardson was a duster at 400 feet. The same parties' No. 7 Fannie Preston was also listed as a dry one at 375 feet.

Harrington & Norris Bros.' third trial on the White and Smith place is dry and plugged at 590 feet. This lease is in the Hall Baker area.

A test made by M. B. Williams, War-

(Continued on Page 156)

Fields of the Central West

By Whit

FINDLAY, Ohio, Jan. 11.—A total of 24 wells were completed in the Central West Field, 7 of which were oil wells, with a flush production of but 84 bbls., 7 dry holes and 20 gas wells. The productive Allendale Field of Wabash County, Illinois, failed to report any completions in the new Stillwell Pool, and the Central Ohio area did not show anything above 25-bbl. producers. The Allendale Field experienced exceedingly cold weather, enough to freeze the water lines which have just been thawed out and drilling resumed on something like 25 wells. The next week or so should show some wells worth while. It is the most active point in the Central West Field.

The only producer of any magnitude was a 50-bbl. well found in the Bridgeport Field of Lawrence County, Illinois. The wildcatter is now tuning up and will soon get busy. One important wildcat is getting ready to spud on the Nattkemper farm in Sugar Creek Township, Vigo County, Indiana, between the Wabash River and the Indiana-Illinois State line, several miles to the southwest of Terre Haute toward the Robinson, Ill., Field. Should this test open up either oil or gas in commercial quantities, it will add thousands of acres to the producing regions. Several wildcats will also start shortly adjacent to the productive areas of Wabash County, Illinois, and in several spots throughout the State and the same can be said of many parts of Indiana, central and northwestern Ohio, as well as Michigan. Central Ohio will no doubt get more wells of the test order than any other section of the Central West Field north of the Ohio River, as the large gas operating companies will leave no stone unturned to find new gas production and at the same time these wells will test the oil possibilities.

Lima Field

The Lima Field of northwestern Ohio had a very poor week, there being but five completions reported with a flush of 11 bbls., one dry hole and one gas well. One old producing well was also reported abandoned. Much leasing is going on in different parts of the field not only outside of defined limits but within defined limits as many leases that were producing oil in the early stages of the field and later abandoned are being released for drilling purposes and the lower extremities of the Trenton Rock will be more thoroughly explored than ever.

The Ohio Oil Co. drilled in No. 14 well near the southwest quarter of the J. E. Huntington farm, in the southeast quarter of Section 23, Allen Township, Hancock County, resulting in a 3-bbl. producer. Top of Trenton at 1,305 feet and drilled 275 feet in to a total depth of 1,580 feet.

Abbott & Wallace's test in the northeast corner of the Alfred Garrard farm, in the northwest quarter of Section 12, Wayne Township, Auglaize County, proved a light gas well. Top of sand at 1,450 feet and drilled 50 feet in. It also showed for about 3 bbls. oil.

Charles F. Zeising and others' test, 1,200 feet from the south line and 200 from the west line of the Herman Linke farm, mapped as the A. Linke farm, in the southwest quarter of Section 18, Woodville Township, Sandusky County, developed into a duster. Top of sand at 1,213 feet and drilled to a total depth of 1,250 feet, where salt water was encountered.

In Monclova Township, Lucas County, Doblinger Brothers' second test near the southeast corner of the Amelia Ward farm, mapped as the O. Ruckel farm, in the southwest quarter of Section 9, has been reported as showing for 5 bbls. Top of sand at 1,266 feet and bottom at 1,301 feet. This well was shot with dynamite and caved in badly and attempts are being made to clean out the hole.

Payne Field

Estes, Myers & Bailey, known as the Bailey Oil Co., completed their initial well, 250 feet from the south line and

(Continued on Page 152)

Capacity 120,000 Pounds

SUSPENDING all the weight of the drill-pipe, and rotating it, the swivel is the crux of rotary oil-drilling operations. The bearing pressures are tremendous. Mud, grime, slop and shock are the regular fare. Failure is costly if not tragic.

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Pennsylvania-West Virginia

By D. S. Wakenight

Carter Co. has 160-bbl. well, Licking County, Ohio; A. H. Heisey Co., 100 bbls., American Oil & Development Co., 48 bbls., Ritchie County, West Virginia; R. L. Rinehart & Co., 80 bbls. Carnegie Natural Gas gets 80-bbl. well Green County, Pennsylvania; Tague, Cummings & Co., 50 bbls.

PITTSBURGH, Pa., Jan 11.—The pipe line companies in the Eastern fields are welcoming milder weather. In the Southwest Pennsylvania, West Virginia and southeastern Ohio fields much trouble has been experienced by lines freezing during the cold weather of a week ago. Another trouble that is growing acute is that of supplying enough Pennsylvania grade crude to refiners, due to the fact that producers are not selling their credit balances. A great many are refusing to sell in anticipation of another advance in the posted price of crude.

Field Developments

The deep sand territory in southeastern Ohio is starting the new year right by furnishing better than average producers. The shallow sand territory in Morgan County also has completed some fair producers.

In Section 14, Hanover Township, Licking County, the Carter Oil Co. has completed and shot in the Clinton sand No. 12 on the Jacob Vendenbark farm. The well produced 106 bbls. the ensuing 24 hours. Better producers have been completed by the Carter Oil Co. on this farm than in any other in the county.

Duster in Hocking County

In the northwest quarter of Section 5, Ward Township, Hocking County, the Sunday Creek Coal Co. completed in the Clinton sand No. 133 on its own property and is dry. The Clinton sand in this well was found to be broken and contained no oil or gas. This is the second dry hole that has been encountered and in a few instances some large wells have been completed.

In Section 33, Independence Township, Washington County M. M. Stover has completed in the Big Lime No. 11 on the A. J. McMahan farm. The well produced 9 bbls. the first 24 hours after shot. In the southwest quarter of Section 3, Green Township, Monroe County, N. T. Staudt & Co. have a duster in the Keener sand at their No. 4 on the David Crawford farm.

In Section 1, Hopewell Township, Licking County, the A. H. Heisey Co. completed and shot in the Clinton sand No. 4 on the B. V. & Lulu B. Weekley farm. The first 24 hours after shot the well produced 100 bbls. In Section 3, same township and county, the Pure Oil Co.'s No. 3 on the J. H. Farmer farm is good for 40 bbls. a day in the Clinton sand. In the northeast quarter of Section 27, Washington Township, Hocking County, W. C. Adair & Co. have a duster in the Clinton sand at a test on the C. W. Riggs farm. The Clinton sand was found very broken and contained no oil.

Shallow Sand Completion

In the shallow sand territory in the northeast quarter of Section 17, Monroe Township, Harrison County, John C. Arthurs & Co. have a very light pumper in the Berea grit at No. 4 on the Lee Patterson farm. In Newton Township, Licking County, Patton & Horpwell have started to drill a second test on the Amanda Stewart farm.

In the southeast quarter of Section 23, Olive Township, Noble County, T. A. Clark & Co. completed a second test on the Adam Schriver farm. It is a duster in the Macksburg 500-foot sand. In the southeast quarter of Section 24, Cannan Township, Wayne County, Klise, Eckstein & McCann completed a test on the M. Fulton farm through the sand and dry. This well was drilled for gas and found only a little show of oil.

In the southeast quarter of Section 24, York Township, Medina County, Dillon & McFrederick Brothers completed a test on the J. R. Mavee farm. It is a gasser good for 1,759,000 feet in the Clinton sand. The Ohio Fuel Gas Co.'s test on the Robert Nelson, Jr., farm, Section 8, Knox Township, Guernsey County, is dry in the Clinton sand.

Holmes County

Holmes County is still the most active in development work. A good deal of it is in the nature of tests, trying out leases to be developed when the market has reached a point where drilling will be at a profit. In Monroe Township, the Arkansas Fuel Oil Co.'s test on the William Miller farm is a gasser in the Clinton sand. In Section 27, same township, the Empire Gas & Fuel Co. got one of the same kind at a test on the Carl A. Gordon farm. In Section 9, Hardy Township, the Pure Oil Co. is due in the Clinton sand at a test on the W. L. Close farm. Within 10 days there should be six test wells due in the Clinton sand. The Ohio Fuel Gas Co., one of the most active in Adams Township, Guernsey County, has made locations for tests on the Riley Moore, Anna M. Zirles and George Bell farms. The same company has locations on the M. H. Brayden, William Knight and P. L. Mullins farms.

In Section 18, the Ohio Oil Co. is moving the rig on the W. B. Oliver farm and made a location on the Frank Ankrum farm. The Logan Gas Co. has a rig up on the Seward R. Williams farm. Thomas R. Matthews & Co. have started to drill on the W. J. Hutton farm.

Shallow Sand Completions

In Section 3, Madison Township, Licking County, W. W. & A. T. Wehrle have a Berea grit duster at their No. 3 on the J. Q. Hickman farm. In the northwest quarter of Section 18, Enoch Township, Noble County, Orton G. Dunn & Co. had the same luck when they drilled a test on the Louis Garnett farm through the Buell Run sand. David Maxwell & Co. completed a second test on the Raymond Miller farm, in Section 29, Knox Township, Columbiana County. It is good for 4 bbls. a day in the Berea grit.

In Section 33, York Township, the Sun Oil Co. has completed in the Berea grit No. 13 on the C. E. Swytser farm, good for 30 bbls. a day at a depth of 1,225 feet. In Section 28, same township, the same company's No. 14 on the same farm is good for 25 bbls. a day in the same formation. In Section 29, the Pure Oil Co. has completed and shot No. 7 on the George J. Frye farm and good for 20 bbls. a day in the Berea grit.

In Section 8, Marion Township, Morgan County, W. R. Metcalf & Co. have completed in the first Cow Run sand No. 8 on the Louisa Worthington farm good for 4 bbls. a day. In the same section, W. R. Metcalf & Co. completed No. 7 on the same farm good for 5 bbls. a day in the same formation.

Deep Duster in Noble County

In the northeast quarter of Section 8, Jefferson Township, Noble County, the Washington & Noble County Oil & Gas Co. has drilled a test on the David Walters farm through the Niagara lime, to a total depth of 4,377 feet. It is dry in all sands.

In Section 9, Knox Township, Guernsey County, the Ohio Fuel Gas Co. has abandoned at 4,915 feet its test on the R. Nelson, Jr., farm. In Section 23, Alexander Township, Athens County, Cook & Co. are drilling a test on the E. P. Panning farm. In Section 29, same township, W. K. Given, E. W. Gwinner and H. M. Schnitt are drilling a test on the Julian Gift farm.

Starting New Work

In Adams Township, the same company has made locations on the Riley Moore and Anna M. Jirels farms. The same company has shut down at 650 feet on the C. M. Donley farm and drilling at 3,000 feet on the A. C. Sunnafrank farm. In Adams Township, Guernsey County, the Ohio Fuel Gas Co. has made locations on the George Bell and M. Drayden farms. The same company is building a standard rig on the William Knight and has a rig up on the P. I. Mullins farm. The Ohio Oil Co. is drilling at 1,200 feet on the W. S. Oliver farm and has a rig up on the Frank Angrun farm. The Pure Oil Co. has shut down at its test on the Elizabeth Irwin farm. Thomas Metthews and others are drilling at 1,200 feet on the W. J. Hutton farm. The Logan Gas Co. is down 4,300 feet on the E. P. Mizer farm and drilling at 1,000 feet on the S. R. Williams farm.

West Virginia Completions

In the list of late completions, Ritchie and Clay Counties completed two fair producers, both Big Injun sand producers. The better of the two is the American Oil & Development Co.'s test on the Abraham Middleton farm, located in Grant district, Ritchie County. The well produced 48 bbls. the first 24 hours. In Henry district, Clay County, the South Penn Oil Co. has completed, but not shot, No. 8 on the O. D. Stockley farm and showing for an average producer for that district, about 25 bbls. a day. This location is 600 feet south of the South Penn Co.'s first test on this tract.

On Davisson Run, 4 miles west of Clarksburg, Union district, Harrison County, the Reserve Gas Co. has completed a gasser in the Speechley sand at a test on the D. M. Hemrick farm. Ten miles south of Clarksburg, the Grasselli Chemical Co. is drilling a test on the Mary Lawson farm. On Isaac Creek, Union district, 3 miles west of Good Hope, the Hope Natural Gas Co. is moving the rig to its second location on the J. W. Summerville farm and will drill it from the fifth to the Speechley sand.

On Finchs Run, Lincoln district, Marion County, the Bell Oil & Gas Co. has the rig completed for a test on the Kirk Miller farm. At Metz, Mannington district, the Clifton Oil & Gas Co. has a rig up on the O. N. Koen farm.

On Turtle Tree Fork, Ten-Mile district, Harrison County, the South Penn Oil Co.'s No. 4 on the Stephen Myers farm is through the Speechley sand and showing a little oil. In Union district, Ritchie County, the Carnegie Natural Gas Co.'s No. 3 on the F. P. Goff farm is a light gasser in the Gordon sand.

Gasser in Calhoun

In Sheridan district, Calhoun County, the Great Elk Oil Co.'s test on the W. H. Watson farm, an old well drilled down, is a gasser in the Big Injun sand. In Clay district, Wetzel County, the Manufacturers Light & Heat Co. has a gasser in the Gordon sand at a test on the L. Oats farm. In Church district, the same company has a gasser in the Big Injun sand at a test on the J. Ferrell farm. In Jefferson district, Kanawha County, the Tampico Oil Co. has a salt sand gasser at a second test on the George C. Weimer farm. On Rush Creek, Smithfield district, Roane County, Godfrey L. Cabot has started to drill a test on the Nettie Kincaid farm.

Eight miles west of Pine Grove, Magnolia district, Wetzel County, the Silverhill Oil Co. has drilled its test on the Frederick Riggenbach farm through the fifth sand. It is dry in all formations. In Murphy district, Ritchie County, S. A. Powell heirs have a gasser in the Big Injun sand at a test on the Kennedy heirs' farm. In Grant district, the Hope Construction & Refining Co. has a duster at a test on the V. Hartman farm. On Steel Run, Clay district, F. J. Gillespie has now drilled his test on the W. H. V. Jones farm through the Big Injun sand and dry.

Drilling and Starting Tests

In Center district, Wetzel County, the Carnegie Natural Gas Co. has started to drill on the C. T. Goodwin farm. In Church district, the same company is drilling on the J. E. Kimble farm. In Geary district, Roane County, the United Fuel Gas Co. is drilling on the Wesley K. Ellis and M. M. Carpenter farms. In Mannington district, Marion County, Funk & Co. are due in the Big Injun sand at a test on the W. G. Mayne farm.

Marshall County

The Narrows Oil & Gas Co. has started to drill on the Samuel Morris farm. In Liberty district, Burley & Orndoff have a rig up on the Donald Franklin heirs' farm. In Union district, the Hicks Oil Co. has started to drill on the George Rusia farm. The Spider Oil & Gas Co. has moved a drilling machine to a location on the Ann Jocum farm. In Union district, Wood County, Sweeney & Smith are drilling at 1,000 feet on the W. H. Curtis farm. In Jefferson district, S. W. Marple & Co. have shut down on the S. W. Pratt farm.

In DeKalb district, Gilmer County, the Star Producing Co. has completed in the stray sand a second test on the Henrietta Gainer farm. It is a gasser. In Center district, the Hope Construction & Refining Co. is building a road to a location on the Vannoy farm. The same company is rigging up on the Janes farm. The same company has made a location on the Edwards farm.

In Burning Springs district, Wirt County, the Cairo Oil Co.'s second test on the Cairo tract is a gasser in the gas sand. In Clay district, W. C. Patterson has a very light pumper in the Big Injun sand at No. 15 on the C. E. Vandevener farm. In Burning Springs district, Wolfe & O'Brien have a 2-bbl. pumper at No. 29 on the Waite tract. In Union district, Tyler County, Samuel & Gale have a 5-bbl. pumper at No. 10 on the Gale heirs farm.

On Fish Creek, Liberty district, Marshall County, the Carnegie Natural Gas Co. has completed a second test on the T. J. Cole farm and good for 10 bbls. a day in the Gordon sand.

On Goose Creek, Grant District, L. R. Rinehart & Co. have completed in the Big Injun sand No. 3 on the John Scott farm. The well is a Big Injun sand producer and good for 80 bbls. a day, natural. This is the best producer that Ritchie County has furnished in a great many months. On the same stream and district, the South Penn Oil Co. has completed in the same formation a test on the Barbara Jamison farm and is a natural producer good for 3 bbls. a day.

Wetzel County

In Center District, Wetzel County, the Carnegie Natural Gas Co. has completed in the Gordon sand a test on the G. C. Miller farm. It is a light gasser. In the same district, the Manufacturers Light & Heat Co. has completed a test

(Continued on Page 150)

The Wiggins Roof Eliminates Evaporation Reduction and Fire Fighting Equipment

Add to the cost of a gas-tight roof the equipment necessary to make it effective and you increase the cost to a point approaching the cost of a Wiggins Roof.

The Wiggins Roof eliminates the necessity of vapor recovery systems, gasholders and other means of reducing evaporation. It makes unnecessary such extra equipment as flame arrester, vent pipe lines, foam boxes, sprinkler systems, etc. (because these are not needed).

The Wiggins Roof, as we install it, is completely equipped with roof manhole, thief hole vent, etc., ready to prevent evaporation and fire.

Over a period of time, the Wiggins Roof is a low-cost roof, because——

It saves thousands of dollars a year by reducing evaporation.

In addition, it prevents fire.

CHICAGO BRIDGE & IRON WORKS

CHICAGO, 2128 Old Colony Building; NEW YORK, 3147 Hudson Terminal Building; CLEVELAND, 2204 Union Trust Building; DALLAS, 1641 Praetorian Building; ATLANTA, 1054 Healey Building; SAN FRANCISCO, 1054 Rialto Building.

The WIGGINS FLOATING ROOF

Keeps Oil In · Keeps Fire Out

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MEN KNOWN IN OILDOM

Chester W. Brown

The election of Chester W. Brown as 1926 president of the California Chamber of Mines and Oil places at the head of that organization one of the oldest and most respected of California oil men. His introduction to the oil industry dates back over 35 years when he entered the service of Hardison & Stewart, which company, combined with two others, was later merged into the Union Oil Company of California. With a break of only a few years when Mr. Brown joined an expedition to develop some oil fields, gold mining and rubber properties in northern Peru, he has been an employe of the Union Oil Company of California.

While in Peru he made an enviable record. Under a concession from the Peruvian Government, by the building of roads and trails into the unexplored regions of the upper Amazon, he secured in fee 1,000,000 acres of rubber lands for his companies. He also discovered an oil field on the table lands near Lake Titicaca, 13,000 feet above sea level, which, on leaving Peru, he sold to a South American company.

Like many big men who have made their mark in the business world, Mr. Brown started at the bottom rung of the ladder, learning the rudiments of the oil game on the derrick floor. A short time of this and he was promoted by progressive steps until he became superintendent in charge of drilling at Bardsdale and Ojai Valley, at that time the principal producing areas in California.

It was shortly after he had assumed the superintendency that he decided to gamble with fortune in the South American Republic, and while he met with much success there, the call of California was too strong to be withstood, so that the year 1909 again found him associated with the oil industry, this time as manager of the field department of the Union Oil Company of California. Later he was appointed director of exploration and production with the Union, the position he holds today.

Under the guidance of Mr. Brown, the Union Oil Company has led the way in the discovery of new producing areas, both within and without the State of California. In the last six years it has given to the country no less than eight new fields, four of which are in California, two in Colorado and two in Wyoming.

PERSONAL PARAGRAPHS

Forris D. Stevens is expected back in Tulsa after a holiday visit to Michigan.

* * *

George Newberger, vice president and general manager of Aronson & Company, has been elected a director of the United Oil Company.

J. H. Stockton, oil operator and contract driller, has located in San Antonio, Tex.

* * *

J. W. McCulloch of the J. W. McCulloch Company is on his way to New York.

* * *

J. W. Sloan of the International Supply Company has returned from a business trip to the East.

* * *

F. A. Young, independent operator, has returned from a holiday visit with his family in Minnesota.

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L. P. St. Clair, vice president of the Union Oil Company, has returned to Los Angeles following a hasty trip East.

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J. Edward Jones, broker of New York City, is making a tour of the Mid-Continent fields looking over some royalties.

* * *

Alan E. Morphy, formerly secretary of the Pacific Gasoline Company, has been promoted to assistant general manager of that corporation.

* * *

E. E. Schock, former president of the Indiahoma Refining Company, is making a trip to Texas. Mr Schock is operating independently at present.

* * *

W. B. Moses, who operated for years in the Okmulgee district of Oklahoma, has returned to that territory after a whirl at the real estate game in Florida.

* * *

Vice President C. L. Coppage and Clarence Olmstead have been elected to the board of directors and executive committee of California Petroleum Corporation.

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Mr. and Mrs. E. H. Hanson spent the holidays in Casper, Wyo. Mr. Hanson is the representative of the Geological Survey for northern Montana with headquarters at Shelby.

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Mrs. W. S. Porter, widow of the former general manager of the Associated Oil Company, was married recently in San Francisco to Phillip P. Paschel, a real estate man of that city.

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H. H. Sauer and H. S. Roll of the Marland Oil Company of Denver, Colo., will make headquarters at Casper, Wyo., while the Wilson Dome wildcat of the Marland is being completed.

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R. O. Wernheim, formerly Tulsa representative of the American Tank Company of Oklahoma City, is now in charge of the Mutual Life Insurance Company office at Washington, D. C.

* * *

Hugh Neil, secretary of the Pacific Oil Company and vice president of the Southern Pacific Railway Company, is returning to his headquarters in New York after a visit to the Pacific Coast.

* * *

J. D. Stirling, formerly manager of warehousing and distributing for the Vacuum Oil Company in Chicago, has been made general traffic manager for the company with headquarters at New York City.

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Emmett J. Weir, better known as "Bill" in the Okmulgee district where he was located for years, was married recently at Seneca, Ill., to Miss Alice Cecelia Sheedy. The couple will reside at Marseilles, Ill.

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Roderick Burnham, manager of the Union Oil Company, has returned to Los Angeles from South America. He was taken quite ill a short time after arriving in the tropics and this hastened his return somewhat.

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C. A. Reynolds of Blair & Company, who has been in charge of the properties of the Waite Phillips Company since that organization was purchased by the firm of bankers some time ago, has returned from a trip to New York.

* * *

Mr. and Mrs. L. A. Reed have returned to Casper from a trip to California. Mr. Reed came to Casper from Bruin, Pa., and was the builder of the first Midwest refinery in Wyoming. During his stay in Casper, he has watched the great plants that now occupy the site of the first refinery grow under his direction from a small skimming plant to the present size.

B. B. Blair, head of the land department of the Waite Phillips Company, is making a visit to Texas to inspect the company properties in that State. He will visit Gillette Hill, head of the Fort Worth office of the company.

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E. L. Doheny made it possible for the ambition of an Irish singer to be realized when he made a Christmas gift in the form of a year's training under the best masters in Italy to Joseph Regan, a singer of the Pacific Coast.

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M. J. Foley, superintendent of the field work of the Continental Oil Company, returned to Casper to spend the Christmas holidays at his home there. Mr. Foley has been in Denver and the Colorado fields for the past few weeks.

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J. H. G. Wolf, petroleum engineer of San Francisco, Calif., died December 31 at his residence. He was consulting engineer for the Navy Department over a long period of years in connection with the management of the naval reserves.

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Thomas Kinney, former superintendent of the Illinois Pipe Line Company, was in Casper for a few days the past week, looking after the pipe line work in this district for the Continental Oil Company. Mr. Kinney is manager of the Continental's pipe line department.

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Robert D. Longyear, president of the Longyear contract diamond drilling and manufacturing interests, is making a trip through the Mid-Continent Field. His itinerary includes Tulsa and Ponca City, where the company maintains a sales warehouse in charge of Walter G. Klippel.

* * *

Lamour Adams, works manager of the Metric Metal Works of Erie, Pa., familiarly known as "Mike," was the guest of H. L. Montgomery of the Natural Gas Division, Empire Companies, at Bartlesville, Okla., recently. Mr. Adams was on his way to visit the Tulsa branch of his concern.

* * *

Art Sellery and brother, D. W. Sellery, of the land department of the Ohio Oil Company, spent the holidays at the Casper, Wyo., headquarters of that company. Art is now located in New Mexico where he is taking care of the land holdings of the Ohio Oil Company at Artesia and in the wildcat areas.

* * *

Col. Robert W. Stewart, chairman of Standard Oil Company of Indiana; F. H. Wickett, chairman and president of Pan American Petroleum & Transport Company, and associate executives, who have been on a tour of inspection of the Lago Petroleum Properties in Venezuela, are returning to the United States.

* * *

Charles F. W. Young, geologist and mining engineer of Rochester, N. Y., is now making Middle West headquarters in Oklahoma City. He is interested in several Oklahoma oil enterprises and in mineral claims in New Mexico. Mr. Young has been in many foreign countries as a member of the engineering staffs of the Guggenheim & Clark interests.

* * *

J. D. MacGregor has recently been made vice president of the Colombia Syndicate which has extensive acreage in Colombia and which is starting an active new drilling campaign. The Colombia Syndicate is identified with Hayden, Stone and Atlantic, Gulf & West Indies Steamship interests. Mr. MacGregor is in charge of operations in Colombia as well as in charge of Agwi operations in Mexico and has other duties connected with the steamship company. He recently returned from Colombia. His headquarters are in New York.

* * *

J. E. Schroeder of Houston, Tex., is preparing to return to Maracaibo, Venezuela, as the representative of the Hughes Tool Company in the South American fields. Mr. Schroeder is a well known Coastal rotary driller. He has been representing the Hughes Tool Company in those fields for the past year. He says development work in the Lake Maracaibo district is active and predicts an expansion of activities in Colombia and Peru during the coming year. Shipments of material are made through the export department of the company in New York.

Just a Twist of the Nut

If the Plug Sticks— A slight turn of the Nut, to the left, actually lifts the Plug from its seat.

If the Cock Leaks— Turning the Nut to the right draws the Plug down into the Body.

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Tested at 700 lbs. per sq. in.; suitable for 250 lbs. per sq. in. working pressure.

Made in 1-inch, 2-inch, and 3-inch sizes.

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WORLD'S OLDEST AND LARGEST MANUFACTURERS OF OIL FIELD EQUIPMENT

EQUIPMENT AND SUPPLIES

NOVEL CONSTRUCTION IN SMALL COMPRESSORS

The Worthington Pump & Machinery Corp., New York City, has developed a tail rod construction for its small four-cycle, double-acting gas engine compressors. This construction, the company announces, serves the purpose of relieving the weight of the piston on the cylinder bore and also allows greater and more effective circulation of the cooling water through the piston and rod.

The box type frame is heavily ribbed, has full-length bearing on the foundation and is carried above the center line of power stresses to eliminate weaving. Special Diesel iron is used for the power cylinders. These are made separate and bolted to the end of the main frame. Expansion between inner and outer cylinder walls is taken care of by an expansion ring. All water passages are large and free from complications.

Inlet and exhaust valves are located at the top and bottom of the power cylinder, thereby equalizing stresses under temperature changes. The front and rear cylinder heads are symmetrical in shape and provided with large water-cooling spaces. This construction eliminates complicated castings and insufficient water-cooling space incident to construction where valves are located in the cylinder heads. The cylinder design also allows easy inspection and adjustment.

The power piston and rod are water cooled, the circulating water entering the piston rod through the cross-head and after circulating through the piston leaves through the tail rod. Connecting rods, shafts, cross-heads are of forged furnace-annealed steel. A cast-iron housing with hand-hole plates between main frame and compressor cylinder prevents possibility of gas entering the crank case.

A belt-driven Massey governor, mounted on the side of the main frame, is connected by levers to two balanced mixing valves, one for each end of each power cylinder. As an extra precaution a safety flywheel stop short-circuits the ignition on overspeed.

Positive lubrication of the running gear is obtained by a reciprocating pump driven from the cam shaft. A forced-feed lubricator provides lubrication to the power and compressor cylinders and to the metallic packing provided on power and compressor piston rods.

The compressor cylinders are of the Worthington feather valve type, provided with large water-cooling spaces for the cylinder and heads. Valve seats and guards for high pressure work are of hardened forged steel. For low-pressure and vacuum work they are made of hard-close-grained cast iron.

PHILLIPS CO. ORDERS HUNDRED TANK CARS

Phillips Petroleum Co. of Bartlesville, Okla., has placed an order through the Tulsa office of the Standard Tank Car Co. of Sharon, Pa., for 100 class four insulated tank cars of 8,000-gallon capacity.

This is the second large order for insulated cars placed by Phillips with the Standard within six months, the last order for 300 cars having been placed last July. This will make a total of 1,250 Standard cars in Phillips' service.

HAYNES STELLITE BRANCHES

The Haynes Stellite Co. through its sales office in New York has distributed a booklet describing the products which it manufactures. As the user of a product is always interested in all the facts concerning it, the booklet is almost equal to a trip through the various Haynes branches, as they are each portrayed in graphic manner.

NEW SALES REPRESENTATIVE

The Climax Engineering Co., Clinton, Iowa, announces the appointment of F. M. O'Laughlin as sales representative for its Eastern sales territory. Mr. O'Laughlin will make his headquarters at the company's offices, 30 East 42d Street, New York City. George A. Colley, who has previously represented the Climax Engineering Co., has associated himself with the A. G. Griese Co., New York City.

TWO-CYLINDER ENGINE OF IMPROVED DESIGN

The UF Engine is Novo's latest contribution to the industrial world.

This power unit develops 3 to 6 HP. It is a two-cylinder, four-cycle "L" head, hopper or radiator cooled gasoline engine. Crankshaft and power drive shaft run in roller bearings. Connecting rod bearings are pressure cast babbitt, reamed and burnished. Cam shaft in brass bushings.

Engine has independent drive shaft. This drive shaft can be placed on either right or left side of engine, looking at engine from fly wheel end. Drive shaft can be furnished to rotate in either direction of rotation and at several different speeds. In all cases, the governor, carburetor, manifold and magneto side of engine is away from drive shaft side of engine. In other words, the working parts of the engine are always accessible; the mixer, or whatever machine the engine is operating being on the other side of engine.

The engine can be furnished to run the power drive shaft at 400, 600, 1200 and 1800 RPM. The 400 RPM gear combination, rotates the drive shaft left hand, anti-clockwise, looking at the engine from the fly wheel end. The 600 and 1200 RPM gear combination may be had in either direction of rotation. The 1800 RPM gear combination rotates the drive shaft clockwise or right hand direction of rotation, looking at the engine from the fly wheel end.

Crankshaft is opposed throw type, eliminating crankcase pressure, and making a well balanced engine not hitherto found in two-cylinder engines. It runs at 1200 RPM. Engine is cranked right hand—clockwise direction of rotation—in all cases. Drive shaft is gear driven from crank shaft. Standard equipment consists of: Splitdorf high tension magneto and Zenith carburetor, fuel tank and cooling system. It is furnished in hopper and radiator cooled types, and with or without steel house. Complete mechanical description carried in technical Data Sheet No. 130.

PIPE WRAPPING MACHINE

C. F. Wieland, consulting engineer of San Francisco, Calif., has issued a folder on the Wieland pipe wrapping machine. This machine is of the continuous type, and the folder emphasizes the importance to public utilities companies of preserving the life of pipe lines. The folder is of interest to engineers and officials of corporations charged with the installation and maintenance of underground pipe lines.

NEW FIRE STOPPER

The Bastian-Blessing Co., of Chicago, Ill., is bringing out a new machine for stopping fires which is called the "Rego Fire Stopper." The new machine is composed of two main units; a cone shaped container which is full of dry powder and a small tank which is filled with a gas under pressure. When a fire is detected, the machine is inverted, and the resulting stream of powder is directed at the base of the flame.

OXWELDED COOLERS

The December issue of "Oxy-Acetyline Tips," the organ of the Carbon & Carbide Co. of New York, contains among other items, a story dealing with the application of oxwelded coolers used in oil refining. The article points out advantages of oxwelded coolers over coupling coolers, owing to the elimination of leakage, and contains some interesting figures comparing costs of these two types of refining equipment.

UNIQUE FIRE SNUFFER HAS BEEN DEVELOPED

Development of a unique fire snuffer that is said to instantaneously extinguish flames has just been announced by the Simplex Equipment Co. of Los Angeles. The device consists of a casting with a chamber into which steam is injected through a butterfly valve. The steam enters the casing through slots from different parts of the outer chamber, causing a strong cross-current of steam.

Another remarkable feature of the snuffer is its reported ability to clean all the tools before "pulling out" of the hole. A shot of steam through the snuffer as the tools are being pulled out flushes and cleans them instantly, according to the claim of the inventor. The snuffer is installed in the casing below the casing head which is the point from which a fire can be most effectually extinguished.

Another important feature that will interest those who have wells located in territory where lightning is prevalent is its preventive feature. When a thunderstorm approaches, a light flow of steam can be turned into the casing through the snuffer, rendering the fluid incombustible.

Another product that has just been announced by the Simplex Equipment Co. is a super-swab, embodying many distinctive features. The outstanding feature is the new type of rubbers used. Offices of the Simplex Equipment Co. have been established at 629 South Spring Street, Los Angeles, Calif.

LINK-BELT COMPANY SUPERVISING ENGINEER

For some time it has seemed advisable to the management of the Link-Belt Co. to create a new position—that of chief engineer of the company. This new position carries with it the responsibility of general supervisor over all engineering work, harmonizing the practice of their several plants, and following up new engineering development.

The position is being filled by W. W. Sayers, formerly chief engineer of the Philadelphia plant. His new headquarters will be at the general office address, 910 South Michigan Ave., Chicago.

Mr. Sayers graduated from the University of Illinois in 1897 and, in his 23 years of Link-Belt experience, has successfully held many important positions in the engineering, construction and sales departments of the company.

George L. Morehead, for the past six years attached to the management of the several Indianapolis plants, takes on the duties of manager of the Philadelphia plant. Mr. Morehead graduated from the University of Missouri in 1902 and has been with Link-Belt Co. for the past 19 years.

LINK-BELT IN MILWAUKEE

The Link-Belt Co., of Chicago, announces the opening of a branch office in the First Wisconsin National Bank Bldg., Milwaukee, Wis., with R. C. Kendall in charge. This step has been taken, it is announced, as a result of the constantly growing volume of orders for Link-Belt silent chain drives for the transmission of power.

TIDE WATER COMPANY SALES DEVELOPMENT

Announcement has just been made that on January 1 Arthur W. Sullivan, formerly vice president and general manager of the advertising agency of Joseph Richards Co., Inc., became sales development and advertising manager of the Tide Water Oil Co.

For the past four years, Mr. Sullivan has acted as executive on the Tide Water advertising account and hence will be in

A. W. Sullivan

familiar surroundings when he assumes his new duties. Under his direction have been developed the eminently successful advertising campaigns featuring the Veedol "Film of Protection," the "Eight Economies" idea back of Veedol Forzol, and, among others, the recent "Sealed Pump" campaign for Tydol gasoline. Of equal, or greater, importance are the fundamental contributions he has made to the sales programs back of these products.

HERCULES MOTOR CORP. EXPANSION PROGRAM

An expansion program of great proportions, including not only a large additional building to the present plant, but noteworthy additions to the sales and advertising programs, have been announced by the directors of Hercules Motors Corp., Canton, Ohio.

The addition to the former line of two larger engines, Models "TX" and "TXA" of respectively 75 horsepower and 100 horsepower, has made the building program imperative to afford proper production facilities.

The former directors and officers have been re-elected as follows: H. H. Timken, president, Timken Roller Bearing Co., chairman of the board; E. H. Langenbach, president, United Alloy Steel Corp., president; Charles Balough, vice president and general manager; H. P. Blake, secretary.

GASO PUMPS TO ARGENTINE

The Gaso Pump & Burner Mfg. Co., of Tulsa, report a shipment of six Gaso pumping units to the Argentine Republic, for the use of one of the important oil operators in that section.

NEW HAVEN REPRESENTATIVE

The Edward Valve & Manufacturing Co. announces that its New Haven, Conn., representative is now located at 914 Chamber of Commerce Building.

NATURAL GAS DEVELOPMENTS

Southern Counties Gas Company Shows Less Net Earnings

LOS ANGELES, Calif., Jan. 9.—Net profits of the Southern Counties Gas Company of California for the twelve months ending November 30, last, amounted to $586,942.80, as compared with $696,704.25 in the corresponding period of last year, a decrease of 15 per cent, according to a report issued recently. This is equivalent to $46.96 a share on the 12,500 shares of 8 per cent cumulative preferred stock of the company outstanding.

In the month of November, net profits totaled $75,785.97, as compared with $66,884.86 in that month of 1924, an increase of $8,901.11, or 13 per cent. Net profits in November were equivalent to $6.06 a share on the 8 per cent cumulative preferred stock outstanding.

Net earnings for the twelve months, before providing for depreciation, bond interest and miscellaneous expenses, were $1,157,913.57. Net earnings for November, last, were $124,549.92.

Gross earnings of the company for the twelve months ending November 30, last, amounted to $5,280,153.49, as compared with $5,395,991.67 in the corresponding period of last year. Gross earnings in November, last, totaled $514,913.20, showing a substantial gain over the $428,234.72 gross earnings of November, 1924. Operating expenses and taxes in the twelve-months' period of this year totaled $4,122,239.92, as compared with $4,066,537.50 in the same period of 1924. Operating expenses and taxes in November were $390,363.28, as against $310,943.19 in November, 1924.

Liabilities of the company include 15,000 shares of common, 12,500 shares of 8 per cent cumulative preferred and 12,500 shares of 7 per cent cumulative preferred stock, par value $100; the bonded debt outstanding is $8,745,200.

Supplies Many Towns

The Southern Counties Gas Company was incorporated under California laws in 1911 to manage several gas properties in Los Angeles and Orange counties. The company has acquired the entire properties of the Piedmont Gas Company, Covina Gas Company, and the Orange County Gas Company, and the gas plants and distributing system of the Southern California Edison Company at Santa Ana and Whittier. In 1916 the company acquired the Long Beach Consolidated Gas Company, in 1919 the properties of the Upland Gas Company, also gas properties of the Southern California Edison Company located in Santa Barbara, Montecito and Ventura counties, and in 1922 the municipal gas distributing system of the city of Newport Beach. In 1924 the company sold its Long Beach plant and holdings to the city of Long Beach.

The company supplies 48 cities and towns in Los Angeles, Orange, San Barnardino, Santa Barbara and Ventura counties with gas, the business field comprising practically all the important suburban territory within 35 miles of Los Angeles, excepting Pasadena and Redondo.

The company distributes manufactured and natural gas for domestic and industrial purposes to a population estimated at 500,000, serving over 100,000 customers through more than 1,400 miles of mains.

GAS COSTS TWO LIVES

SAN ANGELO, Tex., Jan. 5.—Striking a gas pocket in drilling in Big Lake Oil Co.'s No. 54 in the Reagan County Field cost the lives of Rainey Love, driller, and J. W. Glenn, tool dresser. Will Agnew, a co-worker and son of the contractor, B. F. Agnew, were badly burned.

GREATEST GAS MARKET OF WEST IS PROUD CLAIM OF LOS ANGELES

In its annual review the Los Angeles Times says:

Natural gas is one of a number of valuable by-products of Southern California's great petroleum industry. Dry gas, from which gasoline vapors have been extracted in the field, is produced by this region at the rate of 588,000,000 cubic feet per day.

If no artificial gas were used, this amount of dry gas would be sufficient to supply all of the existing requirements of the ten principal cities of the state. At its peak in 1925 Los Angeles consumed between 150,000,000 and 160,000,000 cubic feet of gas per day. This is the greatest gas market in the West.

About one-sixth of all the dry gas produced in the oil fields is consumed there to generate steam for drilling wells or other purposes. Wet gas comes from the wells at an average of about 1,000 cubic feet per barrel of oil. After the casing head gasoline has been extracted from the wet gas, the dry gas is turned into the supply line and pumped, by compressor plants, to Los Angeles, San Francisco and other cities, for domestic or industrial use.

The daily production of wet gas from oil fields in Southern California during 1925 was estimated by the California Railroad Commission, in cubic feet, as follows: Signal Hill, 110,000,000; Santa Fe Springs, 66,000,000; Huntington Beach, 25,000,000; Torrance, 24,000,000; Dominguez, 60,000,000; Athens and Rosecrans, 39,000,000; Midway-Sunset, 86,000,000; Elk Hills, 55,000,000; Ventura, 45,000,000.

The Ventura field was only producing about 14,000,000 cubic feet a day at the beginning of 1925, but deep sand oil production raised the output to nearly 100,000,000 feet for a time and its average for the year was 45,000,000. One well at Ventura produced $24,000 worth of gas in October, to say nothing of the value of its casing-head gasoline and crude oil.

Early in the year a well which was being drilled at Dominguez blew out and its gas flow for more than two weeks was rated at upward of 75,000,000 cubic feet per day. Its crater finally caved in and sanded up, checking the gas flow. The Rosecrans field experienced several gas blow-outs during the year, the flow in each case being estimated at from 35,000,000 to 50,000,000 cubic feet of gas per day.

CONSERVATION HEAD VISITS MONROE FIELD

SHREVEPORT, La., Jan. 9.—Commissioner V. K. Irion, of the Louisiana Department of Conservation has made his first official visit to the Monroe gas fields and the result of his personal investigation is awaited with considerable interest. It is still a mooted question whether the present allotments of gas to carbon manufacturers should be increased or cut still further, and also whether additional permits shall be issued during the coming year. It is a generally accepted fact that the more the use of gas by the carbon interests is restricted, the easier it will be to interest capital in industrial enterprises which depend on the future gas supply in this field.

Commissioner Irion is contemplating a comprehensive survey of the Monroe gas field, to be followed by an intensive advertising campaign of national scope, indicating that he would ask the next legislature to appropriate $50,000 for this purpose, the matter to be handled either by a special committee or by the conservation department itself. Mr. Irion stated that Monroe "ought by rights to be the greatest manufacturing city in the south" and his intention is to "sell" the gas fields to the manufacturing world.

To further guard against underground leakage, particularly in the Spencer dome (Union Parish) sector of the Monroe gas fields, the department of conservation has issued a new order, relative to finishing gas wells in the Monroe field. The order has special reference to setting casing below the softer formation immediately overlying the gas rock proper and states:

"When a soft light weight and very porous formation is found at the top of the gas rock of the Monroe field, the last string of casing shall be set through this formation and onto a more compact formation below unless such upper formation carries a large volume of gas. In any case the last string of casing shall be set at the top of the hard gas rock or cap.

"Before drilling into the upper portion of the gas rock to determine the point of setting casing, the operator shall use mud made especially heavy by adding such materials as barytes, iron oxide or cement, and shall also have a blow-out preventer in readiness for immediate use unless the true rock pressure of that area is known to be less than 800 pounds.

"When gas of high pressure for its depth exists in the water sands above the gas rock, extra heavy mud shall be used to make certain of its control."

GAS COMPANY TO CUT RATES IN TENNESSEE

KNOXVILLE, Tenn., Jan. 9.—A public utility seeking to cut its rate distinguishes the Knoxville Gas Co., which figures that a lower price will increase consumption and consequently increase revenue. As H. G. Bonner, manager, explains: "The policy of cutting the cost to the consumer and making our return by the sale of large volume of our product is the plan on which we propose to work. To lower the price means less sales resistance. In other words, cheaper and better gas will mean that more people will buy and use it, and in volume we hope we can get our return."

The company hopes to inaugurate a gas rate which will begin with a minimum charge of $1.50. For what each customer uses over 200 cubic feet he will pay under the proposed new rate $1.50 per 1,000 cubic feet, instead of $1.25, the present rate.

Approval of the cut in rates must first be obtained from the state public utilities commission. The company will ask the city to sponsor its proposals to inaugurate revised and lower gas rates.

PINE ISLAND EXTENSION

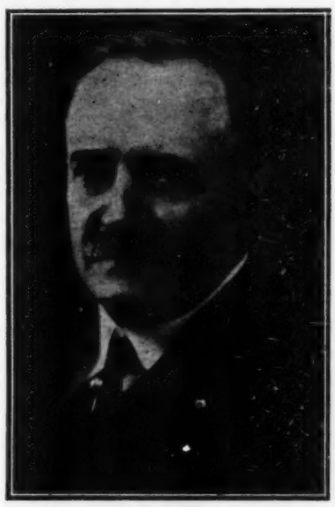
SHREVEPORT, La., Jan. 9.—D. C. Richardson made an important extension of the Pine Island district when his test on the Youree-Randolph lease in Section 13-20-15, blew in with an initial production of between 25,000,000 and 30,000,000 feet of gas at 2,250 feet. The well is three miles southeast of the south end of the Pine Island district and the sand in which it was developed is believed to correspond with the oil producing sand in the Pine Island territory, although somewhat higher as the Pine Island production is obtained from around 2,300 feet.

P. W. LUPHER RESIGNS ON 28 YEARS SERVICE

By Whjt

COLUMBUS, Ohio, Jan. 9.—"After 28 years' grind in the natural gas business, I am convinced," said Preston W. Lupher, of Columbus, Ohio, "that the people of Ohio will never appreciate the luxury which has been brought into their homes. Probably there is more contention and risk in the natural gas business than in any other in the world."

Mr. Lupher resigned as president and general manager of the Logan Gas Co. effective January 1. He gave as his reason poor health, which forced him against the wishes of all the directors of his company to take this step. At present he is confined to his home, 46 North Parkwood Avenue, Bexley, recovering from an attack of acute indigestion.



P. W. Lupher

"In the gas business," he continued, "we must delve into the earth to produce our commodity. Naturally this is a hazardous undertaking. In the early days we were forced to sell gas to compete with coal. Finding dry wells was not very helpful to our business."

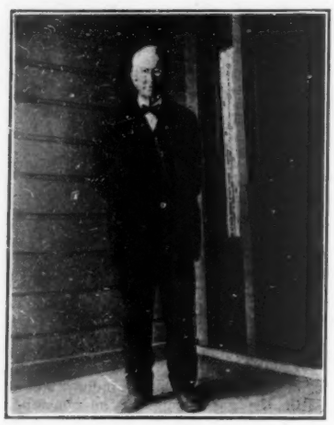
Mr. Lupher has been president and general manager of the Logan Gas Co. for 28 years. On January 1, 1898, Mr. Lupher with some associates became connected with the Logan Natural Gas & Fuel Co., which then represented about 30,000 acres leased in Fairfield County, Ohio, upon which there were six gas wells with pipe lines to the municipalities of Logan and Chillicothe, Ohio. Under Mr. Lupher's direction and management this company has grown until today it furnishes gas to approximately 175,000 consumers, representing about 900,000 people in 75 communities in Ohio. After 28 years of carrying the burden of the hazards and responsibilities peculiar to the natural gas industry Mr. Lupher is desirious to serve on the board of directors. He indicated that he might give some attention, in a personal way, to future oil development. It is close to 50 years since Mr. Lupher joined the ranks of the oil and gas men. It was 49 years ago when he drilled his first well in Clarion County, Pennsylvania. Besides being one of the most prominent of gas men in the country, he is one of the leading oil producers in Ohio. In 1910 he secured leases in Hocking County, Ohio, which justified his faith as to oil deposits and resulted in the organization of the Preston Oil Co. of which Mr. Lupher has, since its organization, been vice president and general manager.

Petroleum Pioneering in California

State's Rank as Oil Producer Result of Long Years of Effort Climaxed in flood of 1923. Story of the Fields

By L. P. Stockman

The history of oil is so interwoven with romance and reality that it reads like fiction. No stranger deeds nor more remarkable adventures are recorded in the fairy tales than are attributed to the pioneers and their successors in the development of the petroleum industry in California. Aladdin and the wonderful lamp was but a prophecy of what has in reality taken place. The writer will make no attempt to record in detail the trials and tribulations of the early pioneers or their immediate successors but will leave this phase for someone more qualified, as it would require many years of research if one were to narrate minutely and chronologically the discovery and evolution of petroleum in California. A short resume, however, might prove of interest in view of the position which California has assumed in the petroleum world during the past few years. The important position which this State enjoys at present, however, was not reached in a short period of time but is the result of a steady growth of many years and



C. A. Burrows, superintendent for several early oil companies in California and connected with the Union Oil Co. up until about 1904. He laid the first pipe line on the Pacific Coast, carrying oil to tidewater, most of which is still in existence and doing good work.

fittingly climaxed by the greatest era in petroleum history during 1923 and 1924.

In the early days, before the commercial value of petroleum was recognized, it was put to many uses. The California Indians were familiar with the location and extent of the various tar beds and oil seepages. They put the asphalt to many uses and it was even used in fastening the arrow and spear heads to their wooden shafts. W. W. Orcutt, one of the early pioneers, and who is vice president of the Union Oil Co. of California, tells us that the Portola Expedition en route from San Diego to San Francisco, encountered Indians a few miles from Santa Barbara making wooden boats, "pitching them within and without" with asphalt. This place, Portola named Carpenteria, which means in Spanish the carpenter's shop. The Indians used the light oil from the seepages for coughs and colds and cuts and burns. This oil was highly prized and was an article of commerce between the coast tribe and the Indians of the interior, who were remote from the source of supply. The early Dons of California and the Padres also knew of the existence and location of these same oil seepages.

First California Refiners

It is recorded that in 1850 Andres Pico and his nephew, Romulo Pico, extracted oil for experimental and refining purposes from the seepages and hand dug pits in the canyon near Newhall, which today bears their name. This is the first reference in the history of California where an attempt was made to utilize crude petroleum. Before the evolution of present day methods of drilling, the plan of development was to run tunnels in the face of the mountain and intercept the oil strata. The oil flowed by gravity and was collected in tanks in the mouth of the tunnels, which varied in length from 10 to 2,000 feet, all of them being more or less productive.

It is interesting to note in this connection that some operators are again reverting to this method of development. The Newport Petroleum Corp. is at present digging an oil mine, so called, into the side of a precipice at Newport Beach, a short distance from the present field at Huntington Beach, in an effort to intercept the tar zone existing in that area around 500 feet. The shaft is being dug at an angle of about 45 degrees, the company believing that perhaps this heavy oil may be mined more economically than drilled. It has been found to be nearly impossible to pump this heavy oil, grading about 8 or 9 degrees in gravity, and, although various methods have been tried, including steam coils and air lifts, only limited success has been attained.

In the early sixties, a merchant in the town of Ventura by the name of Gilbert, erected a small experimental refinery in the Ojai Valley, the oil used being secured from tunnels and natural seepages that exist in the vicinity. Gilbert and his associates later succeeded in interesting Thomas Scott of Philadelphia, a man of ability and considerable means. A syndicate was formed and in the early part of 1865 the first complete set of drilling equipment was sent to California. Scott had two young nephews, Thomas R. Bard and David C. Scott, whom he sent to California to look after his interests. This was the introduction to California of Thomas R. Bard, who was later a great factor in the development of the State and for whom the town of Bardsdale, in Ventura County, was named. Bard was for a long time president of the Union Oil Co. of California and later represented the State of Washington as a Senator.

Six Unprofitable Holes

Scott's first hole was located about 5 miles from the town of Ventura and abandoned in 1866 as unproductive at 500 feet. No. 2 was located 5 miles further away, a little oil being found at 520 feet. No. 3 was drilled approximately 20 miles from Ventura and abandoned at 320 feet, was also No. 4 nearby. No. 5, located on a big seepage in the same locality, was drilled with a spring pole. At approximately 90 feet oil was struck, the hole yielding a small quantity of light oil when put on the beam. No. 6 was drilled nearby with the machinery from New York and it was good for 15 or 20 bbls. a day of good grade oil from 550 feet. This hole proved to be a consistent producer and remained on production for many years. These six holes required about four years' time and the expenditure of approximately $200,000, which was considered lost because of the very limited market.

About the time that Scott and his associates started work Leland Stanford, in furtherance of his railroad project with Huntington and Crocker, was attracted by the seepages in Ventura County and decided to drill a tunnel on the south slope of Sulphur Mountain, so located as to intercept the dipping oil strata. This tunnel, 80 feet in length, with the floor so inclined to the mouth that the oil flowed by gravity into tanks a little lower in elevation, was finished in 1866. The project proved feasible and this method of producing oil was carried on intermittently with varied success for 25 years or more.

First Successful Producer

The first successful producer in Pico Canyon was drilled in 1875 with a spring pole by C. A. Mentre. The hole was located on the axis of a steeply dipping anticline and produced about 2 bbls. of high gravity oil from around 50 feet. Production was doubled later by deepening to 75 feet and a deep hole carried down to 600 feet was good for about 150 bbls. a day. The success which Mentre achieved attracted considerable attention and in 1876 Mentre assigned his lease to the California Star Oil Co. In 1879 McPherson & Felton organized the Pacific Coast Oil Co., which later was absorbed by the Standard Oil Co. of California, and started work in this area.

Stewart & Hardison, who had already been identified with the industry in Pennsylvania, arrived in California in 1883 and, although four holes were drilled just east of Pico Canyon, near Newhall, they were all dry. This disheartening start did not discourage them, however, and a fifth test was put down some distance away and resulted in good production. The property was sold in 1902 to the Pacific Coast Oil Co., the remuneration proving sufficient to offset the losses sustained by these two sturdy pioneers in their previous dry hole. Hardison & Stewart then moved to Santa Paula, in Ventura County, and their success in this vicinity resulted in that county becoming the principal petroleum center of the State. These two pioneers later laid the foundation for the Union Oil Co. of California, the second largest concern in the State at present, whose record during the past decade in opening up new fields has been little short of phenomenal.

First Practical Refinery

During these 15 or 20 years of drilling, numerous attempts were made to refine the crude oil but the first practical refinery was not finished until 1876. It was erected by Scott & Wood near Newhall, the capacity of the plant at that time being about 20 bbls. a day. A more modern refinery was built by Scott & Morrison in 1879 and the plant, still standing, shows the arrangement and method of refining. The first successful plant in Ventura County was erected in 1878 by E. A. Edwards.

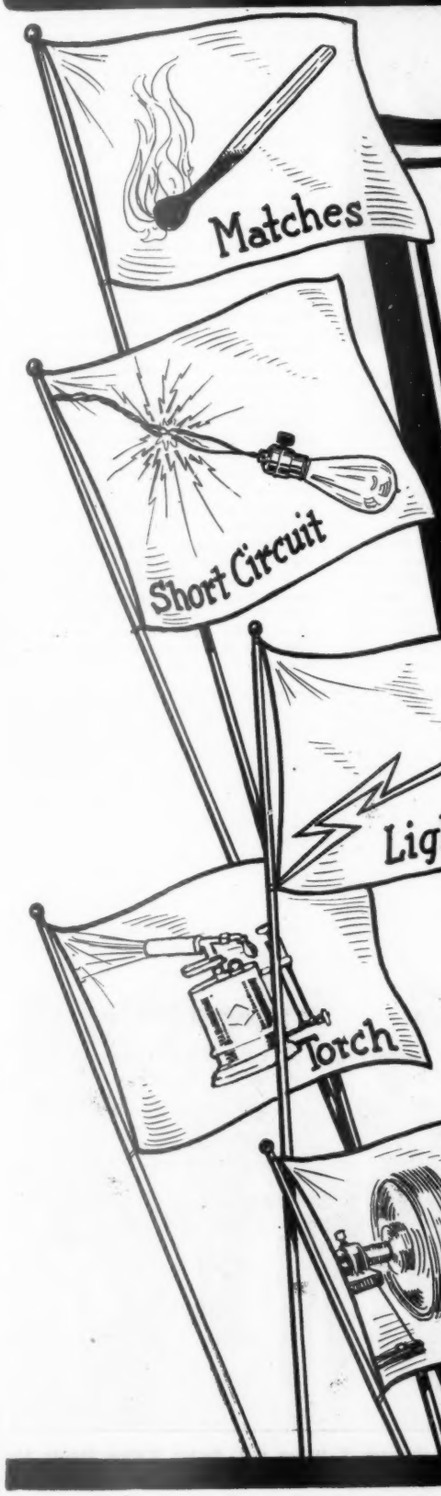
General Andreas Pico. In 1850 this Spanish don took oil for experimental and refining purposes from the seepages and hand-dug pits in the canyon near Newhall, which today bears his name. The picture shows General Pico in the costume he wore when he surrendered to General Fremont.

Certificate of stock for 10 shares of the Los Angeles Pioneer Oil Co., issued to C. Ducommun in October, 1865.

By 1870 considerable wildcatting and development work was being carried on at many points, especially in Los Angeles and Ventura Counties. The Los Angeles Oil Co. was organized in 1876 to prospect some Government land in Ventura County, the locality which abounded in oil seepages being very rough and inaccessible. The company's first producer, finished in 1877, supplied refining crude for Edwards' refinery, finished in 1878.

The first pipe line, although only running a short distance, was laid in 1879 from Pico Canyon to a refinery nearby. The pipe, 2 inches in diameter and 5 miles in length, required no pumping equipment, the oil being allowed to flow by gravity. C. A. Burrows, when superintendent of the Union Oil Co., laid the first pipe line on the Pacific Coast carrying oil to tidewater. The pipe was 4 inches in diameter and ran from Santa Paula to sea level at San Buena Ventura,

danger

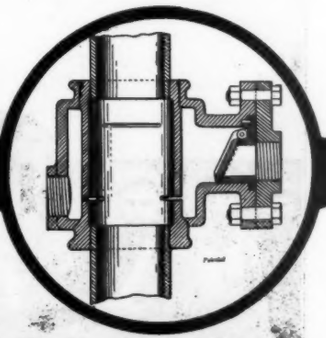


FIRE—The Demon that arises from the unexpected source, can be stamped out INSTANTANEOUSLY—by the simplest of preventive devices—The Simplex Fire Snuffer. But this indispensable device will *do more*. It is the Drillers' Helpmate as well as a Protector. It will eliminate the necessity of cleaning tools on the derrick floor after "pulling out." A shot of steam through the snuffer as the tools are being removed will clean them—"clean as a china dish." This alone saves hours of time and promotes cleanliness and efficiency.

. . . and here's news that is compellingly attractive—its installation will cost you nothing because the saving effected in Insurance Premiums will more than offset the cost of the Snuffer.

The lives of your employees are at stake when a sudden fire occurs. This fact alone makes necessary the installation of the Simplex Snuffer. But you may save yourself thousands of dollars and will certainly reduce drilling costs by its installation. Have us give you *all* the facts.

SIMPLEX EQUIPMENT COMPANY
629 S. Spring St. Los Angeles, Calif.



Simplex Fire Snuffer

It pays for itself as a Tool Cleaner

Fully Patented

Demand a Simplex—the only snuffer with a safety valve. Order through your Supply House.

a distance of 16 miles. The oil in this instance was also run by gravity and, although some of this pipe line has been replaced, most of the original is still in existence and doing efficient work. Burrows also laid the first line from Brea Canyon to tidewater at San Pedro.

Tankage and Tankers

Tankage and dock facilities were constructed at San Buena Ventura for tanker loadings soon after the construction of the original line. The wooden steamers were constructed at San Francisco and put into service early in 1888. These boats, the W. L. Hardison and George Loomis, had a capacity of 6,500 bbls. each and, while they would be insufficient alongside of the 150,000-bbl. tankers of today, they were sufficiently large to meet requirements at that time. The former was later burned to the water's edge while standing at the loading wharf at Ventura. Mr. W. W. Orcutt, vice president of the Union Oil Co. of California, whose book of knowledge has supplied many of the interesting facts recorded herein, recalls that the fire originated in the woodwork behind an overheated cooking stove. The cook and crew, believing that tankers were exceedingly dangerous and liable to explode in case of fire, hastily left the tanker and allowed it to burn. A bucket of water would have extinguished the fire and removed any danger to the ship or crew. The steel tanks, which were part of the equipment of the W. L. Hardison, were later salvaged and used for storage purposes at Santa Paula. The George Loomis is still in active service as a barge in San Francisco Bay.

Early Gusher Disastrous

While California has been on the oil map for many years, it has only been during the past 15 years or so that gushers have been brought in with any regularity. The first hole credited with a large natural flow was No. 16 Adams of the Union Oil Co. in Ventura County, finished in 1892. Its completion was really disastrous, as no preparations had been made to handle so large an output. Before it could be placed under control, oil had flowed down the canyon into the river and finally to the sea.

In 1898 several big wells were finished at Coalinga, which, previous to this time, had yielded only small pumpers. The field was discovered in 1887 by a Mr. McWhorter, who operated a couple of small stills with which he refined oil taken from seepages and shallow pits. The first systematic drilling was undertaken in 1895 but it was not until the Home Oil Co. finished its famous "Blue Goose" that this district was regarded as real gusher territory. This well came in with an initial flow of from 1,500 to 2,000 bbls. per day and remained on production for a considerable length of time. Other wells of the Home Oil Co. and the Chanslor & Canfield interests later came in flowing but none quite equaled the output of the celebrated "Blue Goose."

Following these completions, wells were put down in rapid succession and the "Oil City Pool" was developed. From this beginning of many vicissitudes and disappointments has grown the great Coalinga Field, which ranked first in point of importance until the strike at Midway.

Coalinga Structures

Coalinga, which is the most northerly field in California from which any appreciable amount of production is obtained, presents three types of structure. The great plunging Coalinga anticline, which runs out into the valley in a southeast direction, forms the East Side Field and furnishes the greater portion of the production. West of this anticline there is a syncline which runs down Pleasant Valley. There is a small area around the head of this syncline which is productive. The monocline on the west side of Pleasant Valley forms the West Side Field. Wells in the West Side Field range from 500 to 2,500 feet in depth, while those at the head of the syncline and along the Coalinga anticline in the East Side range from 800 to 4,000 feet in depth. The outer limits of the field have been established for a good many years, although there is still some wildcatting being done along the Jacalitos anticline. The field is served by pipe lines of the Standard, Associated, Union and Shell Oil Companies.

Although oil seepages were known to exist in the vicinity of Santa Maria as early as 1895, it was not until March, 1901, that the first commercial producer was brought in. This was the Western Union Oil Co.'s well No. 2. Three years later, in December, 1904, the Union brought in No. 1 Hartnell, the largest flowing well ever finished in this area. Its initial flow was many times in excess of anything that had been developed heretofore in the State and retained this distinction until the big gushers in the Maricopa-Midway area were opened up. The gas pressure was tremendous and the volume of oil was measured in weir boxes by a number of engineers. The initial output, estimated at 12,000 bbls. a day, continued for about three months without any apparent dimunition. A continuous flow was maintained for over two years, approximately 3,000,000 bbls. of oil being recovered before the well was put on the beam.

State's Largest Well

During the next few years several other gushers were finished in other parts of the Santa Maria Field, many of which had a capacity nearly equal to that of No. 1 Hartnell. The largest and most spectacular well ever finished in California was No. 1 Lakeview of the Union Oil Co. at Maricopa, which blew in on March 15, 1910, flowing 15,000 bbls. a day. The production gradually increased, however, until May 18, when it reached 70,000 bbls. a day. The average from this time until July 12, when the well began to decline, was 50,000 bbls. a day. The well was running wild during all this period, huge levees and dams being constructed in an effort to prevent the oil from inundating the surrounding property. The flow was so great, however, that crude overflowed into all nearby lowlands, even reaching Buena Vista Lake, several miles away.

Approximately 9,000,000 bbls. were produced during its flowing period of 18 months, about 4,000,000 bbls. of which was recovered and pumped under difficulty into the Union's heavily taxed system. The sand produced with the oil was a veritable sand blast and when the casing was finally worn through the hole caved in and this remarkable gusher sanded up. It was later redrilled and cleaned out and, although it is still on production intermittently, the output since its completion has only been small.

Prehistoric Bones

In 1888, Stewart & McFarland drilled a hole near the Brea beds on the Hancock ranch, located near the westerly limits of the city of Los Angeles, but did not succeed in developing production. W. W. Orcutt, in making an examination of

W. W. Orcutt, pioneer operator and vice president of the Union Oil Co. of California, who is president of the society and a prime mover in erecting a monument to old pioneers in Newhall. Ground has already been secured and work will probably be started in the near future.

the Brea beds in this vicinity some years later, noted several white bones in the black surface of hard asphaltum. He was instrumental in having them removed and a search undertaken for other specimens. Within a short time several skulls, bones and vertebrae of prehistoric animals were uncovered and removed. These were kept for several years and later forwarded to Leland Stanford University at Palo Alto for identification and display. No specimens of the kind had previously been found in the United States and the matter was deemed of such historical value that Hancock turned over the Brea beds for research purposes. In a short time the property allotted to various institutions throughout the country was the scene of much work. Several complete skeletons, some of which measured 16 feet in length, were recovered and it is remarkable that in many instances every bone of the skeleton was found. Approximately 300 complete skeletons of saber tooth tigers, mastodons, elephants, bison, horses, wolves, foxes and innumerable small animals were recovered.

These Brea beds proved to be the richest find of material of this kind ever uncovered in the world. A very complete display of these prehistoric and extinct animals may be found in the museum at Los Angeles, the Smithsonian Institute and University of California at Berkeley, as well as several institutions in Europe. Much of the surrounding property has been subdivided during the past few years and Allen Hancock, the owner, after deeding the major Brea pit to the County of Los Angeles, is contemplating the erection of a museum to be erected on the site. Work is to be started on the landscaping soon and models of the prehistoric animals uncovered are to be placed at various points in the park.

E. L. Doheny's Career

E. L. Doheny, probably one of the most successful individual operators, had a rather romantic start in California. Doheny, who rose from a small calling to one of the shrewdest operators in the world, started in a small way but by perseverance, was successful in developing production and played a very important part in the petroleum history of California. Doheny dug many hand pits in 1892 in what is now known as the Los Angeles Field, which, after much effort, yielded commercial oil. His first hole, which yielded a small production of heavy oil, was located on the corner of Patton and Colton Streets and only 155 feet in depth. His success in securing production resulted in a mild stampede to the new field and in the short space of two or three years several hundred shallow wells were sunk. In all, some 1,300 wells appear to have been drilled in this very limited area, of which the larger part, at least 1,100, have been

Crew of the Union's Santa Paula refinery, taken in 1888. From left to right they are: C. Wilson, O. C. Parker, William Temple, Sam Parsons, William Carpenter, ——Bear, ——Clark, unknown, Sade Parker, ——Huff, unknown.

Invitational

to members and friends of

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Cards of invitation may be secured by mail or at the Oil Age Convention Headquarters at the Biltmore Hotel, Los Angeles.

See the January Issue of The Oil Age, for article "Oil-Coke Briquettes, The Perfect Fuel." Copy will be mailed upon request

THE OIL AGE PUBLISHING COMPANY
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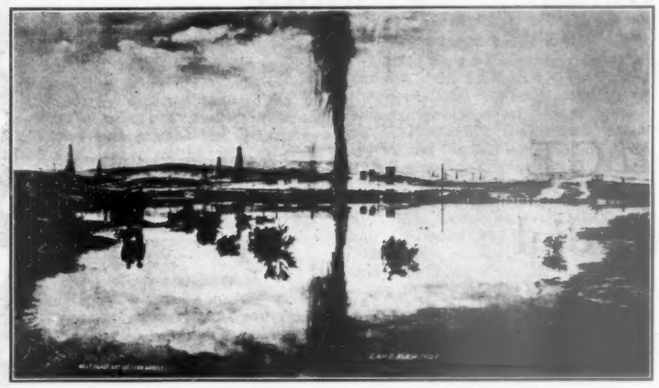
at one time productive. Of this number but 290 are now producing, some being abandoned as unprofitable and others removed to make way for residences. The total output of the City Pool has greatly diminished for this reason and it is but natural, considering its age and the large number of abandonments.

This discovery by Doheny, which resulted in the first big overproduction, was really the beginning of the fuel oil business. The price dropped and oil-burning equipment was installed wherever possible and, although the railroad companies were skeptical and did not at this time utilize the oil for fuel, they later made the substitution and locomotives west of the Rockies have been burning oil practically exclusively ever since. The overproduction was so great as compared with the limited means of disposal at that time that the marketing companies were compelled to build up a market. The Union Oil Co., working on the assumption that the railroads would be large consumers if it were possible to substitute oil for coal, accordingly borrowed an old locomotive from the Santa Fe Railroad. It was taken to Santa Paula and fitted with oil-burning equipment. After several months of arduous work the experiment was at last pronounced a success and a new era had descended upon the oil industry in California.



No. 1 Lakeview of the Union Oil Co. at Maricopa, the largest gusher ever completed in California. It blew in doing 70,000 bbls. a day in 1910 and literally inundated the surrounding country.

First Oil Locomotive

This was the first oil locomotive in the world to burn fuel oil. Soon after, the Santa and Southern Pacific Railroad Companies installed oil-burning apparatus and a good demand for fuel oil was built up. These concerns later entered the oil-producing game on a large scale, the former now operating as the Chanslor-Canfield Midway Oil Co. and the latter as the Pacific Oil Co. Early railroad grants, which later were proven up as oil bearing, gave the latter a good start and this property is today the backbone of the Pacific's large reserves.

Exposed strata in Pico Wiley anticline. Note small plant in foreground.

Doheny, the real discoverer and developer of both the Los Angeles and Olinda Pools, also played an important part in the history of Kern River and other San Joaquin Valley fields. Oil was discovered in the Kern River Field by J. M. Ellwood in 1899 on the north bank of the Kern River, but it was not until 1901 and 1902, however, that this field reached its large production. The producing area lies along the Kern River just north of the town of Bakersfield, and has a monoclinal structure dipping to the southwest. The field is a consistent steady producer of long lived wells, ranging anywhere from 1 to 150 bbls. daily, the oil averaging in gravity about 13 degrees Baume and the well depth from 200 to 2,000 feet. The field is a rather old one and the present daily average production of the 2,200 wells is approximately 8 bbls. of oil and about 25 bbls. of water.

In 1904 and 1905 the Standard Oil Co. laid the first pipe line out of the district. It was an 8-inch, running from Bakersfield to tidewater at Point Richmond on San Francisco Bay. The Associated Pipe Line Co. later paralleled this line, its northern terminal being at Port Costa. The Union, through its Producers Transportation Co., also has pipe line connections with this field. This line has tidewater terminals at Port San Luis, in San Luis Obispo County, due west of the field.

Poso Creek

Poso Creek is about 3 miles northwest of the producing area of the old Kern River Field. Operations in this vicinity were started back in 1912 by the Standard Oil Co., but early attempts to develop production were rather disappointing. The first well was drilled in Section 15, about 1½ miles southwest of the present producing area, a small production, 10 bbls. a day of clean heavy oil, being obtained from 2,835 feet. Water later broke in when the well was deepened and it was finally abandoned in 1915 after many attempts were made to correct the water trouble. A second hole was drilled in 1913 and abandoned as a duster at 3,000 feet. A deep test was started in January, 1914, in Section 21 and, although several showings were noted above 3,000 feet, commercial production was not secured, notwithstanding the fact that the hole was carried down 6,000 feet.

The first commercial production was developed on Section 27 in 1914 at a depth of 2,500 feet. The initial well produced 190 bbls. of 14.5 gravity oil for a short time but water broke in around the water string, as was the case with the test on Section 15. The necessary repairs were made but 35 bbls. a day was the maximum production secured upon recompletion. A second test on this property was abandoned as a duster at 2,534 feet. The largest well finished in this area was the Standard's well No. 3 on Section 27, which made 50 bbls. from 2,417 feet and later 600 bbls. of clean oil from 2,540 feet. Water broke in, however, and the results since this time have been rather unsatisfactory. No. 1 Perseus of the Standard on Section 11 was carried to 4,600 feet for a deep test but commercial production was not secured.

The first real development work at McKittrick could be said to date from 1878, when the Columbian Oil Co. drilled a shallow dry hole. A second well, drilled several years later to a depth of 1,000 feet, was also a failure. Nothing further was done until 1898, but from this date McKittrick has progressed rapidly. Oil was transported from the field by railroad until 1908, when the Standard laid an 8-inch pipe line. In 1909 the Producers Transportation Co. completed its pipe line terminating at Port Hartford, and in 1910 the Associated extended its pipe line facilities to this field. McKittrick reached its maximum output during 1909, when 5,807,360 bbls. were produced. Total withdrawals to date aggregate 71,479,207 bbls.

Midway-Sunset

The presence of brea and seeps of heavy oil in the foothills of the Temblor Range in the south end of the San Joaquin Valley has been known for over 50 years, but owing in part to a lack of appreciation of the value of petroleum as a whole and especially to the lack of transportation facilities in this portion of the State, Midway-Sunset received but scant attention until the early nineties. Even then, the first serious efforts to develop the resources of the region were concerned with asphalt rather than with petroleum and the production of oil in the Midway-Sunset Field may be said to date from 1900. Pioneering was done in the district by several Bakersfield men in 1889 and 1890, among whom were J. A. Blodgett, John Hambleton, Solomon Jewett, J. O. Lovejoy, W. P. Woods and J. H. Woody.

William DeWitt was another early pioneer and, while justice of the peace at Tulare, drilled a 300-foot hole on Section 2-11-24. The well was located in a bed of brea at the very outcropping of the oil-bearing strata. It was abandoned because of water trouble but it is interesting to note, as evidenced by subsequent development work, that the test was less than half a mile west of commercial production. DeWitt removed his derrick to another bed of brea about 5 miles away and developed a small production of heavy oil which oozed over the top of the casing. In the meantime, Charles Barnard, who had done some drilling at Ventura, secured a lease on 2,000 acres of land held by Jewett & Blodgett. Barnard drilled near DeWitt's second attempt but financial reverses and mechanical trouble resulted in the sale of his interests to Jewett & Blodgett. The latter secured a rig from the Columbian Oil Co., which had previously done some prospecting at McKittrick with indifferent success. Jewett & Blodgett developed a small production of heavy oil but inadequate transportation facilities and prohibitive railroad rates prevented work on anything but a small scale. They did, however, begin quarrying and making asphalt in 1891, which was hauled to Bakersfield by mule team and shipped East. The business was not a very remunerative one, however, and they sold out a partial interest in 1892 to the Standard Asphalt Co. The panic of 1893 resulted in a complete shutdown.

Era of Low Prices

W. E. Youle, an oil driller of wide experience, was later placed in charge of the Jewett & Blodgett wells and started work early in 1894. About 15 wells in all were drilled, good for about 25 bbls. a day of a heavy tarry oil running around 15 degrees in gravity. Operations were suspended the latter part of 1894 but the development of shallow production at Kern River in 1899 furnished the necessary stimulant for a general search for shallow production. Many prospectors located in the Midway-Sunset area and drilling was started at many points. Production was secured in many cases but transportation facilities still held up work. The Sunset Railroad, built primarily to aid the industry, was completed in 1902 but by this time oil prices had dropped so low that only a few of the original companies remained. Lack of water and the heavy cost of transporting timber and machinery also had a tendency to handicap work. The first known sale of Midway oil was from the Producers Guaranty Co. in 1901. Production here increased slowly up until 1903 when operations were again suspended because of low prices. Kern River crude was at that time selling around 10 cents a barrel and low prices prevailed for another four years. Increased prices in 1907 started another period of development at Midway and from this time on the district started to grow, slowly at first but faster as new wells were completed.

This early refinery was built by Scott and Baker in Newhall in 1875, the material being hauled by teams from Los Angeles.

Former Hardison & Stewart employes, taken in 1905. Top row, from left to right: Briggs Daugherty, Ed McCray, Dick Whittier, George W. Fleisher. Lower, left to right: Frank E. Davis, T. O. Toland, John Irwin, Dick Whiddon and L. A. Hardison.

Hovey Hills

The Hovey Hills, which contain about 1,500 acres of productive oil lands, is

Promptitude

IN the old city of Bruges there is a belfry towering high above the houses. Every quarter hour hundreds of bells whose tones are rich and mellow play sprightly tunes so that the good folks below in Bruges may know the hour.

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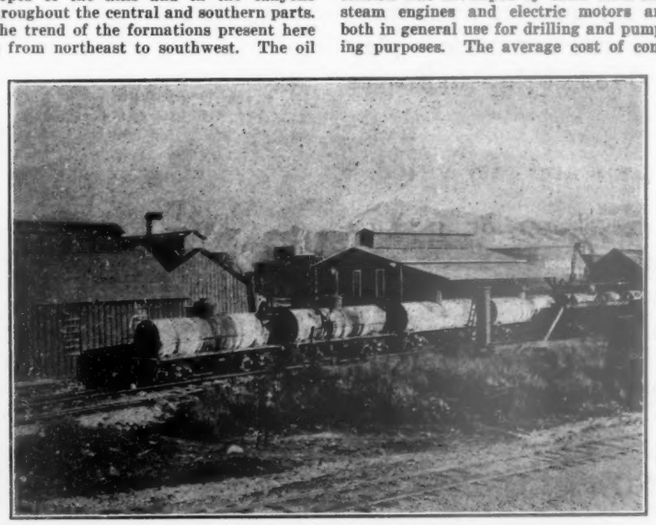
generally covered as a portion of the Midway-Sunset Field, although it is of comparatively recent origin. The area derived its name from that of C. L. Hovey, who at one time owned most of the school land in Section 36 in the central part of the area. Holes were started in 1908 and 1910 during the period of Government withdrawals in an attempt to obtain production and patent the properties before the withdrawal ruling went into effect. Most of these attempts were unsuccessful and the area lay idle until 1917, when the Associated drilled No. 1 Hovey in the north central part of Section 36. The first prospect in the Hovey Hills proper, however, was not spudded

Site of the first refinery in California. Nothing remains but a few timbers and bolts. W. W. Orcutt is an interested spectator.

in until April, 1921. The completion of the first hole started an active drilling campaign on the part of the various companies holding property there, since which time the Hovey Hills area has remained the busiest section in the Midway-Sunset Field.

Surface exposures are fairly numerous throughout the area, especially on the slopes of the hills and in the canyons throughout the central and southern parts. The trend of the formations present here is from northeast to southwest. The oil



Plant of the Mission Transportation Co., Santa Paula, in 1888. This company was one of the pioneers in the carrying of crude produced in the vicinity of San Francisco Bay for refining. The site was later acquired by the Union Oil Co. of California for its Santa Paula refinery.

is of an asphaltic base and the gravity ranges from 13 to 16 degrees, being higher near the upper limits of the structure. The gasoline content is quite low but the oil is quite adaptable for straight fuel oil purposes.

Since the discovery about two years ago of productive sand members in the Maricopa shale there has been considerable interest in this deeper production and in its probable areal limits. The individual sands are quite irregular, however, and production is rather confined to a zone of alternating sands, sandy brown shale and shells up to about 1,000 feet in thickness. This oil is of considerably higher gravity than that of the upper zone and ranges from 14 to 20 degrees in gravity. This deeper zone is also a source of much more stable production, as the wells do not fall off as rapidly as those in the sands above.

Sunset Extension

The Sunset Extension, a component part of the Midway-Sunset area, comprises an area about 2 miles long and 1 mile wide along the foothills southeast of the town of Maricopa and east of the old Jewett & Blodgett refinery at Sunset. The Sunset, or Maricopa Field, lying immediately west of the Sunset Extension, was discovered in the early nineties. At that time several shallow wells, varying in depth and averaging about 130 feet, were sunk by hand in Sections 13 and 18. Production was obtained from these wells by means of a barrel and hoist and the output, although small, was gravitated down flumes to the Jewett & Blodgett refinery, where a fairly high grade of asphalt was made. In the later nineties several wells were drilled in the northwest corner of Section 20 and produced for some time. This oil, a highly viscous, heavy black, tarry substance, was also taken to the Jewett & Blodgett refinery then known as the Standard Asphalt Plant.

During 1900 and 1901 several wells were drilled in the northwest corner of Section 18, but no development took place to the eastward until 1908, when the Hazelton Crude Oil Co. drilled its well in the northwest corner of Section 17. Oil-bearing sands were encountered in this test but it was not productive, due to water trouble. Following these unsuccessful attempts to develop production, the Sunset Extension remained idle until 1922, when the Miocene Oil Co. finished three wells in Section 18. This property has since been acquired by the General Petroleum Corp. They produced an average of 50 bbls. a day, the oil ranging in gravity from 11 to 15 degrees. Operations ceased for a time, due to another slump in the price of crude oil, but in January, 1924, the General Petroleum resumed work and has finished about 20 wells since that date. The Extension was developed by cable tools and steam engines and electric motors are both in general use for drilling and pumping purposes. The average cost of completion in the shallow sand is about $15,000 under ordinary conditions.

Salt Lake Field

The Salt Lake Field differs notably from most of the California fields in the small number of companies which have operated successfully in this area. This group of wells, lying between the western limits of Los Angeles and the Pacific Ocean, was first known under the name Sherman, from a small town a short distance to the north, but is now more generally known as the Salt Lake Field, a name borrowed from that of the first and largest company operating in that area. The first deep drilling done in the Salt Lake-Sherman area occurred during 1885, when Hardison, McFarland & Stewart drilled a short distance southeast of the Brea pits on Wilshire Boulevard. The first commercial production was secured on the Amalgamated Oil Co.'s Salt Lake lease in about 1902 but the greater majority of the drilling done in this field took place between 1905 and 1910. The depths of the producers run from a minimum of 800 feet to a maximum of about 3,500 feet. Practically all of the wells were put on the beam after falling off gradually.

Early California tank car.

It is recorded that on December 30, 1903, Samuel R. Hancock leased to Fred Phillips and W. C. Price approximately 290 acres for the purpose of "producing liquid petroleum." Four wells were drilled by Phillips & Price who later turned them over to the Arcturus Oil Co. No. 1 of the Arcturus came in flowing 2,000 bbls. a day in October, 1904, continuing for about six months at this rate before falling off. No. 4, finished in February, 1905, was unusually good, its initial production being rated at 11,000 bbls. No. 35 was good for 1,000 bbls. a day from 2,200 feet but when deepened in August, 1909, to 2,607 feet, it came in as a big gasser flowing somewhere around 15,000,000 feet of gas.

The crudes of the Salt Lage Field vary widely in gravity but show marked similarity in general properties. A characteristic of all grades is the high yield of asphalt and of light products for any given gravity. The Beverly Hills section of the Salt Lake Field lies approximately a mile or so southwest of the western limits of the Sherman section. The wells are located on a prominent but gentle sloping hill and, although this area has been producing for some time, recent developments indicate that it may perhaps experience a revival of drilling. The Associated recently drilled a hole to 3,594 feet, rather deep for this area, and picked up a hitherto unknown horizon which may result in additional drilling and a substantial boost in production.

Summerland Field

Although the first record of commercial production in the Summerland Field was during the year of 1894, several wells were drilled between 1886 and this date, from which a small production was obtained. The first hole in the vicinity of Summerland was drilled by H. L. Williams in 1886 on Ortega Hill, a rounded knoll north of the railroad, to a depth of 455 feet. This is one of the unique fields in California, practically all the present production coming from wells far beyond low tide line in the open ocean. Early drilling was done with portable rigs and only the lightest of casing, the completion depth ranging between 80 and 150 feet.

Nearly all the early wells were north of the railroad tracks, but it was soon discovered that the dip of the sands was to the south, that is toward the ocean. Development work soon carried the operators across the railroad, then to the beach and finally into the ocean itself. The beach was, of course, Government property and was grabbed by the first comers so that here there were a large number of small holdings, as was the case on the land side. At one time there were upwards of 100 operators in this small field, though this number is now diminished to about 8 or 10 by abandonment and consolidation of properties.

The longest wharf, 1,230 feet in length, was that of the Southern Pacific Railroad, the wells farthest out on the wharf being nearly as productive as those nearer shore. The wharves suffered severely in winter and the ocean tides have long since destroyed many of them and snapped off the well casing, allowing ocean water to enter the hole. This prevented economical production and, although most of the holes have since been plugged, the field produces considerably more water than oil. Several hundred wells were ultimately drilled in this area but only a limited number remain, about 135 in number.

Fullerton Field

The first field of importance to be opened up in southern California was what is now designated as Fullerton. The title Fullerton is ordinarily applied to the entire group of wells lying along the lower reaches of Brea Canyon and on the hills to the east, although this section is sometimes referred to as Brea-Olinda. The first general development work in this area was done by Rowland & Lacy, predecessors of the Puente Oil Co., later acquired by the Shell Co. The initial attempt was a shallow well drilled to 150 feet in the year 1880. This is the first of the old Puente wells.

John Irwin, who was general superintendent for the Hardison & Stewart interests and later with the Union Oil Co. for over 26 years. Mr. Irwin came from Pennsylvania.

The real development of the field, however, which has produced 107,823,295 bbls. since the original discovery, probably dates from 1900, when the Brea Canyon Oil Co. started operations. The property of this company is an irregular tract, more or less productive. Only a limited amount of information is available as to early work but the data available indicates that completion depths va-

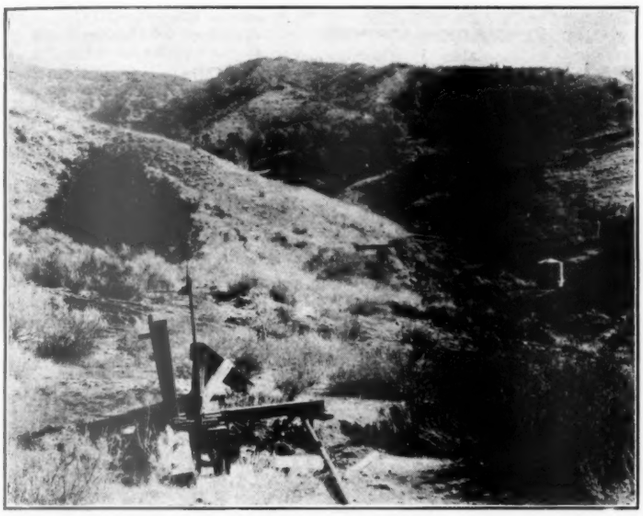
ried between 1,000 and 3,000 feet. The oil runs between 18 and 24 degrees and averages about 21 degrees. The heaviest oil and smallest production is at the upper edge of the formation in the northeast corner, the lighter oil and largest production to the southwest.

Whittier's First Well

Whittier dates from 1898, when the Whittier Crude Oil Co. completed its first well as a producer. The Home Oil Co. followed the Whittier Crude into the field in 1899, while the Colorado Oil Co. made its advent in 1900. No record is available as to the amount produced during the early stages of development but the covery well was drilled to 3,325 feet, after a previous hole, drilled in 1908, was lost because of mechanical difficulty. The total output of this field from the discovery to date is 99,543,194 bbls.

Montebello Field

Several years passed before another field was opened up but early in 1917 the Standard brought in No. 1 Baldwin, followed shortly after by the Union Oil Co.'s No. 1 La Merced. These two wells were the first producers in the present Montebello Field, which reached the peak of production in 1919 and produced 59,781,328 bbls. since being opened up. The discovery of the district was due to scien-



No. 6 Ojai, drilled in 1867 by A. J. Salisbury to a depth of approximately 700 feet. The well was drilled for Senator Bard and later became the property of the Union Oil Co.

field has been noted for its consistency, rather than any spectacular performence. The producing territory of the Whittier Field lies on the southern slope of the Puente Hills beginning within a mile of the town of Whittier and extending in a southeasterly direction about 2½ miles. The field is developed along the south side of the well-defined Puente fault zone. Producing wells range in depth from 800 feet close to the fault line to nearly 2,500 feet at a distance from the break.

Coyote Hills

The Coyote Hills Field, which lies about 2 miles northeast of the Richfield district and 4 miles northwest of the city

In Pico Canyon, showing the first producing well drilled by Lyman Stewart. The derrick is still in good condition and the well still producing.

of Fullerton, consists of a series of anticlinal domes, three in number. The largest dome, on which the Standard's Murphy and Emory leases are located, is one of the most prolific areas in southern California and the discovery of a new deep sand during the past year will add further to the productivity of this structure. Coyote was really opened up by the Murphy Oil Co. in 1909. The discovery tific geological study and not as the result of haphazard drilling. The first well, No. 1 Baldwin of the Standard, was started on December 12, 1916, and was completed on February 24, 1917, doing 360 bbls. from 2,395 feet. No. 1 La Merced of the Union came in flowing 110 bbls. of 21.2 gravity oil from 2,560 feet.

Richfield District

The Standard and Union were also responsible for opening up the Richfield district. The latter is generally credited with opening up the district, although the former was first to secure production due to mechanical trouble in the Union test. This company probably deserves credit, however, since it was also first to enter the district. It was during the latter part of 1918 that the Standard finished No. 1 Kramer, followed a little later by No. 1 Chapman of the Union. The former was a small producer good for 110 bbls. from 2,762 feet, but No. 1 Chapman made 4,000 bbls. of clean 23.0 gravity oil from 3,045 feet. The production recovered during 1918 was negligible but the field increased from a total output during 1919 of 965,408 bbls. to a high of 8,314,528 bbls. in 1922, the total output during its entire life of less than seven years being 63,200,029 bbls.

The Montebello Field occupies the crest and flank of an anticline in the La Merced Hills, which lie about 1 mile north of the town of Montebello and about 5 miles east of Los Angeles. Topographically, the La Merced Hills form a spur at the eastern extremity of the Repetto Hills, which extend westward to Los Angeles and disappear eastward under the Rio Hondo and San Gabriel Rivers. The axis of the anticline follows in a general way the east and west trend of the hills, which terminate in rather an abrupt slope at the east end and a slope more gently toward the west where they merge with the valley floor. The subsurface anticline of the La Merced Hills conforms very closely to the topography of the hills. The highest point in the hills is not, however, the apex of the anticline, it being near the eastern edge of the hills on the Temple lease of the Standard. Three productive zones exist, the oil from the upper testing approximately 20 degrees, that from the second, 25 degrees and the lower, 28 degrees.

Wheeler Ridge

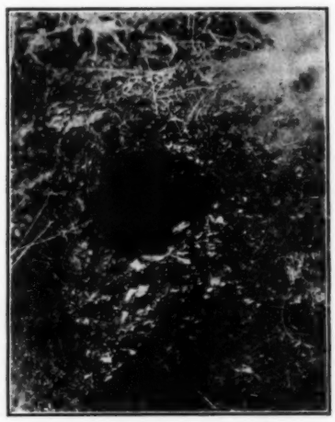
With the exception of Wheeler Ridge, no new fields have been opened up in northern California for several years, although this section is always regarded as having unlimited possibilities. This is due, of course, to the fact that for several years wildcatting has been at a minimum and development work in the San Joaquin Valley area was restricted because of the heavy overproduction in southern California. During the past year or so the number of prospect wells has been increasing and recent developments indicate that a new field may possibly be opened up near Raisin City in Fresno County. A wildcat in this area has, within the past few weeks, shown favorable indications and the Associated is sinking four tests in order to test out thoroughly the locality, believing that, perhaps, the deep Fresno United's well may be on the edge of a prospective structure.

The Wheeler Ridge oil field is approximately 21 miles east of Maricopa and 33 miles south of Bakersfield in the extreme southern end of the San Joaquin Valley. The field is located on a prominent ridge having a general east-west trend, 1,500 feet above the valley floor and is 17 miles east of the nearest oil production in the Sunset Field. The first prospect was drilled near the center of Section 26-11-20 by the Henderson Oil & Development Co. in 1914 and, although the hole was carried to 2,920 feet, no favorable showings were encountered.

The Standard drilled to 5,130 feet on Section 26 in 1921 but abandoned it after several unsuccessful tests for production at various depths, spending in excess of $175,000 before quitting this hole. The company was not satisfied, however, and continued operations in 1922, this time spudding in on Section 28, 2 miles west of its first hole and about 1,000 feet higher on the ridge. Over $15,000 was expended in road construction to this second hole before the spud was made on June 4. Encouraging showings were encountered between 1,500 and 1,700 feet but production tests were not satisfactory. Drilling was continued and on November 24, 1922, the discovery well was brought in from 2,130 feet after being plugged back from 2,185 feet, with an initial production of 270 bbls. of 25.5 gravity oil. Additional drilling was immediately started and later developments proved the existence of a deeper and somewhat more productive zone around 4,100 feet. The initial well in the deep sands was good for 400 bbls. of 31 gravity oil, accompanied by considerable gas.

Difficult Location

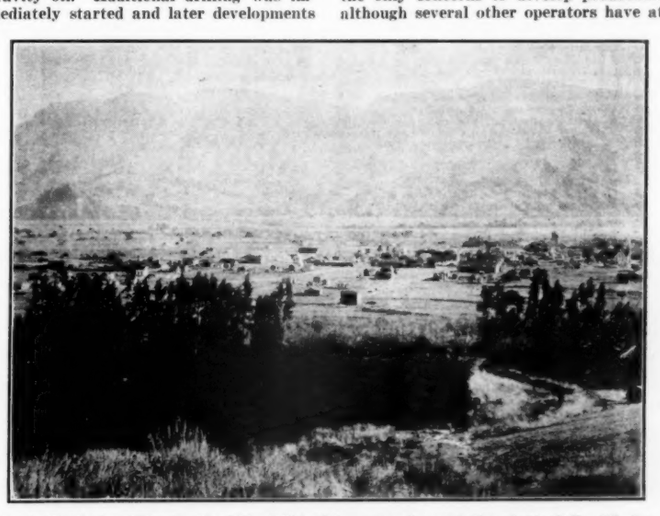
The structure is a very narrow anticline with an east-west trend. The axis, plunging a little more steeply to the east, is broken and ended on the west by faults. Oil seepages have been of common knowledge in Coal Oil Canyon near the line of faulting for several years. All drilling to date has been done with rotary tools, which permits of fairly fast drilling time. During the early stages of development, the Standard bucked nearly insurmountable obstacles. The initial test was located on a steep slope which rose 750 feet in less than one-half mile. Tractors, however, towed the trucks loaded with material to the location and temporary quarters were established for the crew. These temporary kitchens and



One of the many tunnels dug in Sulphur Mountain in the early days to intercept the oil strata. Some of them were large enough to permit a man standing erect to walk through the entrance. Many cave-ins have closed up most of these holes, but some of them are still producing, small pipes having been driven through the debris.

quarters have since been replaced by permanent structures affording the 125 present employes comfortable living quarters.

Lack of water proved a big obstacle during the early days, the company finding it necessary to lay a 2½-inch line and pipe in boiling water from a point 7½ miles from the scene of operations. Drinking water was tanked in from Taft, a distance of 35 miles. A satisfactory water supply has since been developed and the temporary roads improved materially by oiling and reducing the average grade from 14 per cent to 4 per cent. The General Petroleum and Standard are the only concerns to develop production, although several other operators have attempted to do so. The General Petroleum's pipe line extending from Midway to Los Angeles passes the field just to the east and affords this concern ample transportation facilities. The Standard has just finished its line connecting up with its facilities at Maricopa, all pipe line runs heretofore being made to the General Petroleum.



Santa Paula in 1888. On the left of the picture may be seen the plant of the Mission Transportation Co.

The discovery of importance at Lost Hills was that of Martin & Dudley, who

(Continued on Page 167)

Burners Tested for Domestic Heating

Elaborate Series of Experiments Conducted by the Government for the Benefit of the General Public

By Arthur H. Senner
Assistant Mechanical Engineer, Bureau of Public Roads, Division of Agricultural Engineering

The growth of the oil burning industry within the last few years has been so rapid and so many types of burners have been put on the market that the public has been unable to keep pace with the situation. This condition has resulted in a large popular demand for information on oil burners and their adaptability to domestic heating. For this reason a series of tests has been made on various types of oil burners by the United States Department of Agriculture, a few of which will be discussed in this article.

No attempt has been made to give comparative data or to discuss the merits of the different burners. Various conditions were imposed on them and the tests conducted as described.

The Chemistry of Combustion

Before giving the results of tests on the burners, the author has considered it of general interest to review the elementary chemical reactions involved in combustion and to illustrate with problems.

Combustion or burning, as it is generally considered, is any kind of chemical combination in which heat is evolved. In engineering, the kind of combustion in which we are particularly interested is the combination of the various fuels with oxygen. In this connection, then, the word combustible may imply anything that is capable of combining rapidly with oxygen to produce heat.

Chemical combinations or reactions always take place in definite weight relations that are characteristic of the elements acting, and in definite volume changes that are dependent upon the number of gaseous molecules reacting and the number produced.

The following table gives weights of the substances concerned in the combustion of the oils used on these tests.

Substance	Chemical symbol and weight of Atom	Molecule
Carbon	C=12.01	.....
Sulphur	S=32.07	.....
Oxygen	O=16.00	O_2=32.00
Nitrogen	N=14.04	N_2=28.08
Hydrogen	H= 1.008	H_2= 2.015
Carbon dioxide	.....	CO_2=44.01
Carbon monoxide	.....	CO =28.01
Water	.....	H_2O=18.02
Sulphur dioxide	.....	SO_2=64.07

When sufficient air is supplied, and other conditions satisfied, carbon will combine with oxygen in the following manner:

$$C+O_2=CO_2$$

and this relation when expressed by the weights entering in,

$$12+32=44$$

or

$$1+2.67=3.67$$

that is, 2.67 lbs. of O_2 are required per pound of C. Similarly,

$$2H_2+O_2=2H_2O$$
$$4+32=36$$
$$1+8=9$$

that is, 8 lbs. of O_2 are required per pound of H_2. And finally,

$$S+O_2=SO_2$$

or

$$32+32=64$$
$$1+1=2$$

that is, 1 lb. of O_2 is required per pound of S. In the above relations the approximate atomic weights have been used.

From each of the three reactions expressed above, the quantities of O_2 required to combine with C, H_2 and S have been determined. From a knowledge of the proportion of oxygen in the air, these calculations may be extended

INVESTIGATION OF DOMESTIC OIL BURNERS—TABLE 2: LOG OF TEST DATA

Item No.	ITEMS AND UNITS:															FOR B
1	Test number	449	450	393	394	395	396	397	398	399	400	401	402	403	404	40
2	Date	3-7-25	3-7-25	3-23-25	3-23-25	3-24-25	3-24-25	3-24-25	3-25-25	3-25-25	3-25-25	3-26-25	3-26-25	3-26-25	3-26-25	3-30-2
3	Duration of test—hours	1	1	0.83	1	1	1	0.66	0.66	1	1	0.83	1	1	1	
4	Heater used, number of sections	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
5	Fuel, kind and sample number	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist.
	RATES—															
6	Fuel burned, pounds per hour	13.04	16.15	14.96	14.76	9.10	8.76	22.24	19.98	11.76	11.83	12.13	13.15	9.98	13.42	18.41
7	Fuel burned, gallons per hour	1.833	2.270	2.103	2.074	1.279	1.231	3.126	2.808	1.653	1.663	1.705	1.848	1.403	1.886	2.58
	DRAFT—															
8	Base of flue, inches of water	0.002	0.061	0.069	0.004	0.056	+0.019	0.070	0.061	0.061	+0.014	+0.002	0.055	+0.002	+0.002	+0.00
9	Combustion chamber, inches of water	0.006	0.032	0.036	0.006	0.034	0.000	0.034	0.037	0.036	0.000	0.004	0.029	0.003	0.003	0.00
10	Ash pit, inches of water	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TEMPERATURES—															
11	Cooling water outlet, T. C. No. 1	124	121	131	101	135	103	102	104	81	91	.....	69	69	76	7
12	Cooling water inlet, T. C. No. 2	40	39	53	49	50	45	44	49	49	49	.....	40	40	40	4
13	Tank water inlet, left, T. C. No. 3	186	188	183	184	152	170	181	190	143	165	162	148	135	150	17
14	Tank water inlet, right, T. C. No. 4	186	188	182	183	150	169	180	189	142	163	160	146	134	148	17
15	Water, top section of heater, T. C. No. 5	184	187	184	185	154	170	181	191	147	165	159	161	137	151	17
16	Tank water outlet, left, T. C. No. 6	155	154	149	144	137	141	140	149	116	134	138	119	107	119	13
17	Tank water outlet, right, T. C. No. 7	155	154	151	145	136	142	140	151	116	133	138	119	107	119	13
18	Water, boiler inlet, left, T. C. No. 8	155	154	151	145	137	142	141	151	117	134	139	119	107	119	13
19	Water, boiler inlet, right, T. C. No. 9	155	154	151	145	137	142	141	151	117	134	139	119	107	119	13
20	Ash pit surface, right, T. C. No. 10	85	87	69	84	65	77	78	80	78	84	59	69	70	75	8
21	Ash pit surface, left, T. C. No. 11	88	90	72	85	68	79	79	82	79	85	60	69	70	75	7
22	Surface firepot section, right, T. C. No. 12	140	139	135	134	121	130	129	139	109	124	121	106	100	109	12
23	Surface firepot section, left, T. C. No. 13	148	148	142	140	128	136	137	145	114	131	131	113	104	115	13
24	Surface shallow intermediate section, right, T. C. No. 14	136	136	132	132	113	121	129	126	113	124	114	108	102	110	12
25	Surface shallow intermediate section, left, T. C. No. 15	170	173	167	168	141	153	167	176	137	152	148	137	123	139	16
26	Surface, top section, right, T. C. No. 16	169	173	169	168	142	153	166	173	138	152	146	139	128	139	16
27	Surface, top section, left, T. C. No. 17	176	182	175	175	144	165	173	181	145	164	152	146	136	148	16
28	Surface, deep intermediate section, right, T. C. No. 18	115	116	116	116	100	107	111	119	100	110	99	92	91	97	11
29	Surface, deep intermediate section, left, T. C. No. 19	158	161	155	155	133	144	154	162	127	142	142	126	119	131	15
30	Fuel, T. C. No. 20	76	75	65	68	64	69	61	66	70	75	57	57	61	62	6
31	Surface smoke pipe, T. C. No. 21	222	315	316	280	231	197	355	341	250	235	242	287	227	250	27
32	Flue gas, T. C. No. 22	489	587	586	524	421	369	653	617	507	434	454	527	427	465	49
33	Air to ash pit, T. C. No. 23	67	68	69	80	64	67	73	71	70	76	58	65	60	64	7
	FLUE GAS ANALYSIS—															
34	Carbon dioxide, per cent by volume	10.0	7.9	6.1	9.9	3.1	9.4	10.0	9.4	5.3	10.9	9.6	5.7	8.1	10.8	13.
35	Oxygen, per cent by volume	7.3	10.4	12.4	7.2	16.0	8.0	7.3	7.7	13.9	6.2	8.0	13.0	9.9	6.3	1.
36	Carbon monoxide, per cent by volume	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.
37	Nitrogen, per cent by volume (difference)	82.7	81.7	81.5	82.9	80.9	82.6	82.7	82.9	80.8	82.9	82.4	81.3	82.0	82.9	84.
	PSYCHROMETER READINGS—															
38	Wet bulb	60	61	52	58	57	58	57	58	61	65	56	58	61	61	5
39	Dry bulb	75	76	66	69	68	70	60	70	72	74	63	68	71	72	6
	QUANTITIES—															
40	Cooling water passed through cooler, pounds per hour	1623	2115	1060	3455	347	2702	2503	3375	3409	3434	0	4966	3500	3695	588
	Heat in boiler and tank water:															
41	Beginning of test, B.t.u.	184265	188369	154208	170336	142572	195738	149692	178750	126014	154188	104460	143679	116794	121347	14026
42	End of test, B.t.u.	208933	204295	208250	185068	175473	164292	208185	211424	147226	173998	222263	140873	130831	157989	19026
43	Heat added to boiler and tank water, net B.t.u. per hr.	24668	15926	64850	14732	32901	—31445	57729	49011	21212	19810	141364	—2806	14037	36642	4999
44	Heat removed by cooling water, net B.t.u. per hour	136218	173282	83528	179660	29432	156689	145178	185322	108985	144331	0	144362	101745	133242	17063
45	Heat imparted to tank water, net B.t.u. per hour	160886	189208	148379	194392	62333	125244	232917	234333	130197	164141	141364	141556	116782	169884	22063
	HEAT BALANCE PER POUND OF FUEL AS FIRED—															
46	Heat imparted to tank water, B.t.u.	12338	11716	9916	13166	6850	14297	10470	11728	11071	13875	11652	10764	11601	12659	1198
47	Heat lost due to moisture content of fuel, B.t.u.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
48	Heat lost due to water vapor formed in burning hydrogen, B.t.u.	1429	1483	1494	1458	1409	1370	1534	1509	1447	1402	1434	1472	1416	1434	144
49	Heat lost due to moisture in air used for combustion, B.t.u.	30	49	40	34	78	22	52	42	68	35	31	60	38	31	
50	Heat carried away by dry chimney gases, B.t.u.	2086	3238	4243	2314	5592	1545	2987	2924	4066	1669	2046	3994	2199	1838	153
51	Heat lost by radiation from heater and smoke pipe, B.t.u.	359	423	463	406	459	444	372	389	410	369	381	380	331	307	36
52	Heat lost due to unconsumed gaseous combustible matter, B.t.u.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
53	Heat lost due to unconsumed combustible in soot, B.t.u.															
54	Heat lost due to convection and unaccounted losses, B.t.u.	2994	2327	3080	1858	4848	1558	3821	2644	2174	1886	3692	2566	3650	2967	394
55	Total heat value of fuel as fired, B.t.u. per pound	19236	19236	19236	19236	19236	19236	19236	19236	19236	19236	19236	19236	19236	19236	1923
	HEAT BALANCE, PER CENT HEAT IN FUEL AS FIRED—															
56	Heat imparted to tank water, (thermal efficiency) per cent	64.1	60.9	51.5	68.4	35.6	74.3	54.4	61.0	57.6	72.1	60.5	55.9	60.3	65.8	62.
57	Heat lost due to moisture content of fuel, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.
58	Heat lost due to water vapor formed in burning hydrogen, per cent	7.4	7.7	7.8	7.6	7.3	7.1	8.0	7.8	7.5	7.3	7.4	7.6	7.4	7.4	7.
59	Heat lost due to moisture in air used for combustion, per cent	0.2	0.2	0.2	0.2	0.4	0.1	0.3	0.2	0.4	0.2	0.2	0.3	0.2	0.2	0.
60	Heat carried away by dry chimney gases, per cent	10.8	16.8	22.0	12.0	29.1	8.0	16.5	15.20	21.1	8.7	10.6	20.8	11.4	9.6	8.
61	Heat lost by radiation from heater and smoke pipe, per cent	1.9	2.2	2.4	2.1	2.4	2.3	1.9	2.0	2.1	1.9	2.0	2.0	1.7	1.6	1.
62	Heat lost due to unconsumed gaseous combustible matter, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.
63	Heat lost due to unconsumed combustible in soot, per cent															
64	Heat lost due to convection and unaccounted losses, per cent	15.6	12.2	16.1	9.7	25.2	8.2	19.9	13.8	11.3	9.8	19.3	13.4	19.0	15.4	20.
65	Total heat value of fuel as fired, per pound	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.
	ELECTRIC POWER, D. C.—															
66	Volts	110.4	109.6	112.0	112.0	111.9	112.1	112.0	111.8	111.9	111.9	113.7	114.0	113.8	113.4	110.
67	Amperes	0.4	0.5	0.4	0.3	0.3	0.3	0.3	0.3	0.2	0.3	0.4	0.3	0.5	0.3	0.
68	Watts	44.2	54.8	44.8	33.6	33.6	33.6	33.6	33.5	33.6	33.6	44.5	34.2	56.9	34.4	33.

in order to ascertain the quantity of air entering into these reactions. By weight, air is composed of approximately 23.15 per cent of O_2 and 76.85 per cent of N, and it follows that 1 lb. of O_2 is represented in 1÷.2315=4.32 lbs. of air.

From Figure No. 2 in which are shown the ultimate analyses of the fuels used, we find that the constituents are given as carbon, hydrogen, sulphur and the combined percentage of oxygen and nitrogen. For convenience in working the following problem, we will divide this combined figure in two parts and attribute each of the equally divided percentages to oxygen and nitrogen.

The following calculations are for fuel oil distillate No. 3 as represented in the last column of the table of "Analyses of Oil Fuels," Distillate No. 3 (Fig. No. 2).

	Wt. in lbs. per lb. fuel	Required lbs. O_2	Required lbs. Air	Products of combustion CO_2	O_2	N_2	H_2O	SO_2
C	.8451	2.256	9.746	3.101	....	7.490	.....	....
H_2	.1298	1.038	4.484	.....	....	3.446	1.168	....
O_2	.0099	.....	.....	.....	.010	.....	.....	....
N_2	.0099	.....	.....	.....	....	.010	.....	.010
S	.0053	.005	.022	.....	....	.017	.....	.010
	1.0000	3.299	14.252	3.101	.010	10.963	1.168	.010
					.010	.033*	.....	....
				3.101	.000	10.930	1.168	.010

*N_2 equivalent of O_2 in fuel.

However, in an Orsat apparatus the SO_2 is absorbed with CO_2, thus:

CO_2	O_2	N_2	H_2O
3.101	0	10.930	1.168
.010	.....	.....	.....
3.111	0	10.930	1.168

The total weight of the products of combustion then is:

3.111
10.930
1.168

15.209 lbs.

Therefore, the pounds of air theoretically required per pound of fuel is equal to 15.209 minus 1 (weight of fuel)= 14.209.

Following are the weights of products of combustion with varied air fuel ratio, per pound of fuel:

	No Excess lbs.	20% lbs.	40% lbs.	60% lbs.	80% lbs.	100% lbs	150% lbs.	200% lbs.	250% lbs.	300% lbs.
CO_2	3.111	3.111	3.111	3.111	3.111	3.111	3.111	3.111	3.111	3.111
O_2	0	0.658	1.316	1.974	2.632	3.290	4.935	6.580	8.225	9.870
N_2	10.930	13.116	15.302	17.488	19.674	21.860	27.325	32.790	31.255	43.720
H_2O	1.168	1.168	1.168	1.168	1.168	1.168	1.168	1.168	1.168	1.168
Wet products	15.209	18.053	20.897	23.741	26.585	29.429	36.539	43.649	50.759	57.869
Dry products	14.041	16.885	19.729	22.573	25.417	28.261	35.373	42.481	49.591	56.701

For an Orsat analysis—the H_2O is not determined. So that the dry products of combustion per pound of fuel, in per cent, are:

	No Excess Per ct.	20% Per ct.	40% Per ct.	60% Per ct.	80% Per ct.	100% Per ct.	150% Per ct.	200% Per ct.	250% Per ct.	300% Per ct.
CO_2	22.16	18.43	15.77	13.78	12.24	11.01	8.80	7.22	6.27	5.49
O_2	0.00	3.90	6.67	8.75	10.35	11.64	13.95	15.49	16.59	17.41
N_2	77.84	77.67	77.56	77.47	77.41	77.35	77.25	77.19	77.14	77.10

Now to reduce this to volume; this conversion is made by dividing the respective percentages by the molecular weights, thus:

	No Excess	20%	40%	60%	80%	100%	150%	200%	250%	300%
CO_2÷44	.5036	.4189	.3584	.3132	.2782	.2502	.2000	.1664	.1425	.1248
O_2÷32	.0000	.1219	.2084	.2734	.3234	.3638	.4359	.4841	.5184	.5441
N_2÷28	2.7800	2.7739	2.7770	2.7667	2.7646	2.7625	2.7589	2.7568	2.7550	2.7536
Total	3.2836	3.3147	3.3368	3.3533	3.3662	3.3765	3.3948	3.4073	3.4159	3.4225
	Per Cent by Volume									
CO_2	15.3	12.6	10.7	9.3	8.3	7.4	5.9	4.9	4.2	3.6
O_2	0.00	3.7	6.2	8.2	9.6	10.8	12.8	14.2	15.2	15.9
N_2	84.7	83.7	83.1	82.5	82.1	81.8	81.3	80.9	80.6	80.5

Figure 23 is a curve showing the relation between excess fuel percentage and per cent CO_2 resulting from complete combustion of distillate fuel listed as sample No. 3 in table "Analyses of Oil Fuels," Figure 2. The abcissae represent the percentage of excess air that has been admitted and the percentage CO_2 is shown as the ordinate. From this curve it is seen that the CO_2 content has a maximum of 15.3 per cent with no excess air. This is termed perfect and complete combustion. Obviously, it follows from the computations which have been given above, that this maximum point and, in fact, the form of the whole curve depends upon the chemical constituents of the oil.

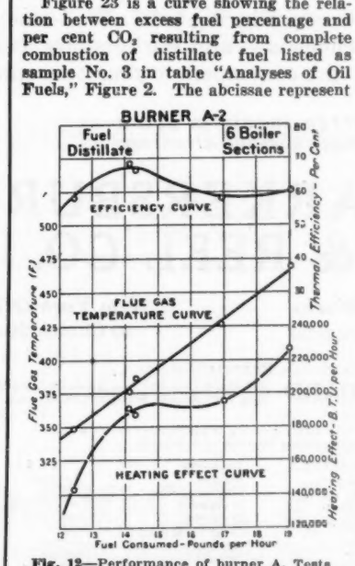


Fig. 12—Performance of burner A. Tests made with constant conditions; boiler of six sections; fuel, distillate 10 per cent CO_2 in flue gas. Runs Nos. 497-501.

This curve holds surprisingly close for a broad grade of oil fuels, by virtue of the fact that the chemical make-up, especially as regards H and C, of the various oils is quite uniform. Thus, while it was stated specifically that these computations and Figure 23, were arrived at from a consideration of the one fuel, namely distillate sample No. 3, they really hold good for any of the oils listed in Figure 2.

The desideratum in combustion is to operate with the minimum of excess air and thus realize as high a CO_2 percentage as is feasible. However, most oil burner manufacturers agree that a margin of safety is highly desirable and, therefore, recommend that 30 per cent, or possibly more, excess air shall be admitted in order to obviate the sooty condition inherent to incomplete combustion which would ensue if a slight diminution of the air supply resulted when operating near the limit.

It is to be noted that more curves of interest and value to the man interested in design, etc., may be gleaned from the computations given above. For example, with the same abscissae, per cent excess air, the weight of the products of combustion may be plotted as ordinates. This curve is not shown but by reference to the figures given in one of the charts, it is seen that the weights increase from a minimum with no excess air to greater and greater values as the percentage of air increases. This increase in percentage of air is, of course, accompanied by an increased stack loss and decrease of combustion temperature because of dilution by inert gases. This effect is brought out clearly by the accompanying characteristic curves which show the comparative performance under greater and less favorable conditions of operation.

The bearing in mind of the basic ideas regarding combustion as brought out in the preface will induce a more interesting and comprehensive analysis of the curves and figures to be presented below.

Tests

The boilers in which all tests were conducted were American Radiator Co. Ideal 25-inch Arco boilers, designated as 4-25-W, 5-25-W and 6-25-W. Their ratings as of April 3, 1924, are 1240, 1320 and 1375 square feet, respectively. The grate area is 3.14 square feet.

In these tests the control of the burner by automatic devices was omitted, no attempt being made to determine the effectiveness or efficiency of this phase of the burner operation.

Object of Tests

The object of these tests was to determine primarily the thermal efficiencies to be realized with the burner under various conditions of operation. The thermal efficiency may be defined as the ratio of the heat absorbed by the water in the boiler to the heat contained in the fuel supplied. In other words, it is the proportion of the heat energy of the fuel which is actually transmitted to the heating medium, which in this case is water.

Description of Test Plants

By referring to Figure 1, a study can

GOVERNMENT TESTS OIL BURNERS

For some months past there has been under way in the Department of Agriculture a series of tests of oil burners for domestic heating. These tests were undertaken jointly by the Bureau of Home Economics and the Bureau of Public Roads in order that they might be able to answer more definitely the inquiries which they were receiving in increasing numbers regarding the various kinds of oil burners.

In the course of these investigations eight burners of the "atomizing" type and ten of the "vaporizing," or gravity feed type, were tested and their essential characteristics determined. Tests were begun under the direction of A. M. Daniels, associate mechanical engineer. In the spring of 1925 Mr. Daniels resigned and Arthur H. Senner, assistant mechanical engineer, took charge of the work. W. R. Humphries, E. W. Hunter and Robert O'Leary aided in conducting the tests and preparing the report on the investigation. Full reports on this investigation will be issued later by the Department of Agriculture.

FOR BURNER C—1925

[*FO—Furnace Oil]

406	423	424	425	426	427	440	441	442	451	452
3-30-25	4-10-25	4-10-25	4-11-25	4-11-25	4-11-25	4-25-25	4-25-25	4-25-25	4-30-25	4-30-25
1	1	1	1	1	0.66	1	1	1	1	1
6	6	6	6	6	6	6	6	6	6	6
Dist. 2	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3
8.09	10.55	13.39	14.97	16.49	18.64	19.55	15.48	8.94	9.39	11.91
1.137	1.516	1.924	2.151	2.370	2.678	2.809	2.224	1.285	1.349	1.711
+0.005	0.000	0.014	0.031	0.061	0.046	0.059	0.056	0.044	0.061	0.060
0.010	0.013	0.025	0.034	0.054	0.030	0.028	0.038	0.030	0.036	0.030
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
99	97	86	85	89	93	91	93	84	109	106
49	55	55	48	52	54	57	57	57	56	56
148	156	174	160	176	181	166	166	139	148	163
146	155	173	159	174	180	164	164	138	146	161
147	157	174	161	176	183	169	169	143	150	166
122	129	138	125	138	141	132	134	119	129	138
122	129	140	127	138	143	132	135	119	129	138
123	130	141	128	139	142	133	135	119	130	139
123	130	141	128	139	142	133	136	119	130	139
84	81	92	75	91	91	73	85	84	70	74
82	82	92	76	91	91	74	85	84	72	78
114	119	129	118	130	132	121	123	111	115	123
120	125	136	124	136	139	129	131	115	122	132
112	116	124	121	132	133	126	125	114	110	119
136	142	157	150	163	168	157	156	136	139	152
136	146	161	149	162	168	157	155	136	139	151
140	150	163	152	165	174	163	161	139	142	157
100	102	109	107	117	118	116	112	108	98	103
130	136	148	140	152	156	146	145	124	131	141
67	73	75	67	76	78	72	74	78	68	67
193	216	246	265	294	330	348	302	242	242	276
341	383	441	478	527	592	610	539	417	421	491
68	70	73	64	73	78	72	74	78	69	72
9.6	10.1	10.8	10.1	9.5	10.1	8.5	7.2	3.7	3.0	4.0
8.1	6.3	6.2	6.6	8.0	7.5	8.9	11.0	15.3	16.0	15.2
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82.3	83.6	83.0	83.3	82.5	82.4	82.6	81.8	81.0	81.0	80.8
57	61	63	60	60	59	65	65	68	58	60
68	67	70	72	72	70	70	70	73	67	67
1607	2367	5253	3581	4759	4558	4037	3961	3820	1040	2025
127783	133233	166753	118768	149536	157510	113269	140826	135312	140473	162927
155627	166513	176490	186018	189716	196220	191932	176730	132561	160129	168551
27744	33280	9737	66250	40180	58065	78663	35904	—2751	19656	5624
80221	99249	162633	132640	171086	177508	137056	142358	103025	55006	101048
107965	132529	172370	198890	211266	235573	215719	178262	100274	74662	106672
13345	12562	12873	13286	12812	12634	11034	11515	11216	7951	8956
0	0	0	0	0	0	0	0	0	0	0
1363	1392	1421	1450	1465	1497	1514	1474	1404	1418	1457
20	30	35	32	38	39	74	75	118	90	94
1431	1558	1718	2003	2384	2578	3149	3219	4524	5726	5170
418	382	373	319	371	392	373	328	447	451	456
0	0	0	0	0	0	0	0	0	0	0
2659	4011	3515	2845	2865	2795	3791	3324	2226	4299	3802
19236	19935	19935	19935	19935	19935	19935	19935	19935	19935	19935
69.4	63.0	64.6	66.6	64.3	63.4	55.3	57.7	56.3	39.9	44.9
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.1	7.0	7.1	7.3	7.3	7.5	7.6	7.4	7.0	7.1	7.3
0.1	0.2	0.2	0.2	0.2	0.2	0.4	0.4	0.6	0.4	0.5
7.4	7.8	8.6	10.0	12.0	12.9	15.8	16.1	22.7	28.7	25.9
2.2	1.9	1.9	1.6	1.9	2.0	1.9	1.6	2.2	2.3	2.3
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13.8	20.1	17.6	14.3	14.3	14.0	19.0	16.8	11.2	21.6	19.1
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
110.2	114.1	113.6	112.9	112.8	113.6	110.9	110.0	112.2	112.3	111.9
0.2	0.4	0.5	0.4	0.4	0.5	0.4	0.5	0.5	0.3	0.4
33.0	45.8	56.8	45.2	45.1	56.8	44.1	55.0	56.1	33.7	44.8

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Swing Joint doesn't depend upon side sheets for rigidity. It is *self-supporting* — rigid — and will not sag, twist, or bind.

Winch is enclosed in a gas-tight Hatch Box, for installation on the tank deck, where it is convenient for the gauger. The cable is not exposed to the weather.

Swing Pipe can be supported in any position without need for ratchets or locking devices — the spooling drum operates through worm and gear.

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Hominy
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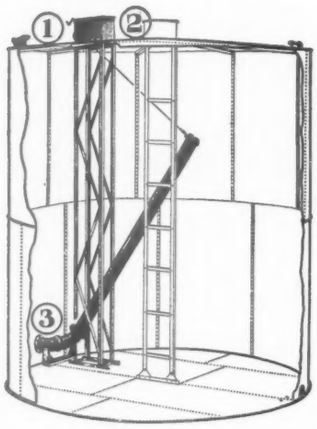
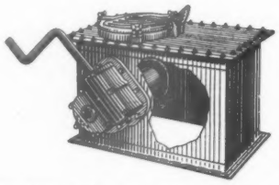


1 Parkersburg Self-Clamping Gauge Hole Covers remain closed and tight until opened by raising the foot-lever. The joint between the lid and the body of the cover is sealed by a special composition gasket.

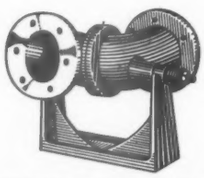
These gauge hole covers are recommended for flow, lease, or stock tanks, and for high or low pressures.

The Self-Clamping feature is a simple toggle-link mechanism. A glance at the illustration will convince you of its simplicity and its merits.



2 Parkersburg Hatch Box, enclosing the spool and cable, is electrically welded at joints and to re-enforcing angles. The cover is provided with a "look" opening and lid. The box is bolted to the tank deck — with gasket between, making a gas-tight joint. Use of stuffing boxes is eliminated.

Hand crank turns spool through a worm and gear — no locking device needed to hold swing pipe in any position. The latticed column support for the hatch box gives added stiffness to the deck, and carries the weight of the swing pipe, hatch box and winch.



3 Both halves of the Parkersburg Swing Joint are held in close contact by a rod and coiled spring; the joint is leakproof. The supporting cradle carries the weight of the Swing Joint — eliminating any tendency for sagging, twisting, or straining on side sheets or bolts.

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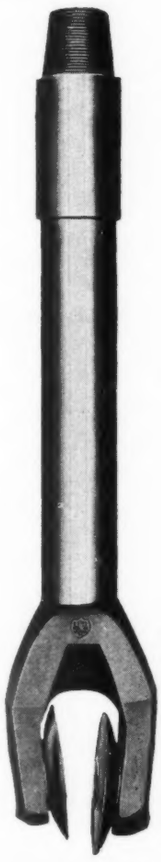

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Manufacturers of Oil Well Tools

Long Beach California

INVESTIGATION OF DOMESTIC OIL BURNERS—TABLE 2: LOG OF TEST DATA

Item No.	ITEMS AND UNITS:													
1	Test number	483	484	485	486	487	488	489	490	491	492	493	494	495
2	Date	5-23-25	5-23-25	5-23-25	5-25-25	5-25-25	5-26-25	5-26-25	5-26-25	5-26-25	5-27-25	5-27-25	5-28-25	5-28-25
3	Duration of test—hours	.75	1	1	1	1	1	1	0.5	1	1	1	1	1
4	Heater used, number of sections	6	6	6	6	6	6	6	6	6	6	6	6	6
5	Fuel, kind and sample number	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3
	RATES—													
6	Fuel burned, pounds per hour	15.68	15.22	15.56	13.08	13.55	13.66	9.70	9.02	14.97	14.63	14.76	17.97	18.11
7	Fuel burned, gallons per hour	2.263	2.188	2.236	1.880	1.947	1.963	1.394	1.296	2.150	2.102	2.121	2.582	2.602
	DRAFT—													
8	Base of flue, inches of water	+0.003	+0.003	0.038	+0.030	0.060	0.014	0.046	+0.007	0.049	+0.005	+0.002	0.005	0.040
9	Combustion chamber, inches of water	0.003	0.004	0.040	0.020	0.060	0.024	0.052	0.001	0.049	0.000	0.001	0.011	0.040
10	Ash pit, inches of water	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TEMPERATURES—													
11	Cooling water outlet, T. C. No. 1	99	88	88	93	96	98	96	101	96	91	93	87	88
12	Cooling water inlet, T. C. No. 2	63	65	64	64	64	61	61	61	61	61	61	60	60
13	Tank water inlet, left, T. C. No. 3	170	164	172	169	172	165	154	162	177	168	171	165	169
14	Tank water inlet, right, T. C. No. 4	169	162	171	168	171	163	153	160	176	167	170	163	168
15	Water, top section of heater, T. C. No. 5	163	164	172	168	172	166	155	162	177	168	171	167	171
16	Tank water outlet, left, T. C. No. 6	137	131	137	137	139	135	131	137	143	136	137	129	135
17	Tank water outlet, right, T. C. No. 7	136	131	138	136	139	134	130	136	144	135	137	129	134
18	Water, boiler inlet, left, T. C. No. 8	137	132	139	137	140	135	131	137	144	136	138	130	135
19	Water, boiler inlet, right, T. C. No. 9	137	132	139	137	140	135	131	137	144	136	138	130	135
20	Ash pit surface, right, T. C. No. 10	341	338	316	355	302	320	243	284	316	316	320	345	338
21	Ash pit surface, left, T. C. No. 11	338	338	320	352	298	322	250	287	313	316	320	341	330
22	Surface firepot section, right, T. C. No. 12	134	139	135	128	133	124	120	128	131	126	128	123	128
23	Surface firepot section, left, T. C. No. 13	136	132	138	137	138	133	128	133	139	135	135	130	134
24	Surface shallow intermediate section, right, T. C. No. 14	132	131	135	121	128	121	118	121	126	122	125	124	127
25	Surface shallow intermediate section, left, T. C. No. 15	159	155	163	155	159	153	144	149	162	163	158	154	158
26	Surface, top section, right, T. C. No. 16	158	153	162	152	158	151	143	149	161	163	165	152	156
27	Surface, top section, left, T. C. No. 17	155	153	163	155	158	153	142	147	157	159	155	153	156
28	Surface, deep intermediate section, right, T. C. No. 18	121	120	125	109	116	109	106	110	111	111	112	111	115
29	Surface, deep intermediate section, left, T. C. No. 19	148	144	151	146	149	143	137	140	151	144	147	144	149
30	Fuel, T. C. No. 20	75	79	82	62	73	67	69	73	72	70	71	68	74
31	Surface smoke pipe, T. C. No. 21	276	242	250	204	220	216	190	183	227	224	227	246	246
32	Flue gas, T. C. No. 22	468	404	411	345	369	369	316	305	386	380	386	427	424
33	Air to ash pit, T. C. No. 23	109	116	116	98	103	95	86	96	93	94	97	100	103
	FLUE GAS ANALYSIS—													
34	Carbon dioxide, per cent by volume	13.5	13.3	9.9	13.7	8.3	10.6	6.7	9.4	8.8	13.4	9.9	13.0	10.5
35	Oxygen, per cent by volume	1.9	2.3	7.3	1.9	9.3	6.4	11.5	7.8	8.3	2.2	6.9	2.8	5.9
36	Carbon monoxide, per cent by volume	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	Nitrogen, per cent by volume (difference)	84.6	84.4	82.8	84.2	82.4	83.0	81.8	82.8	82.9	84.4	83.2	84.2	83.6
	PSYCHROMETER READINGS—													
38	Wet bulb	69	73	71	55	58	55	59	59	63	59	60	58	64
39	Dry bulb	75	79	82	62	72	67	69	73	72	70	71	68	74
	QUANTITIES—													
40	Cooling water passed through cooler, pounds per hour	3480	5542	5383	4911	4902	3173	3082	3006	4328	4266	4380	4952	4871
	Heat in boiler and tank water:													
41	Beginning of test, B.t.u.	140155	124611	147226	149213	163275	129254	146083	162927	161535	137857	144883	110860	122064
42	End of test, B.t.u.	192543	186660	193959	181575	187228	158235	161536	162927	193859	191319	187095	194988	194200
43	Heat added to boiler and tank water, net B.t.u. per hour	69849	62249	46733	32365	23953	58981	15452	0	32324	53462	42212	84128	72136
44	Heat removed by cooling water, net B.t.u. per hour	125001	127189	155756	142124	156521	117179	107655	120000	151177	127767	139898	133506	136144
45	Heat imparted to tank water, net B.t.u. per hour	194851	189438	202489	174489	180474	176160	123107	120000	183501	121229	182110	217634	213280
	HEAT BALANCE PER POUND OF FUEL AS FIRED—													
46	Heat imparted to tank water, B.t.u.	12427	12438	13013	13340	13319	12896	12691	13304	12258	12387	12338	12111	11777
47	Heat lost due to moisture content of fuel, B.t.u.	0	0	0	0	0	0	0	0	0	0	0	0	0
48	Heat lost due to water vapor formed in burning hydrogen, B.t.u.	1435	1396	1396	1385	1386	1392	1351	1351	1395	1394	1396	1421	1413
49	Heat lost due to moisture in air used for combustion, B.t.u.	39	37	43	15	24	18	29	17	34	18	26	21	33
50	Heat carried away by dry chimney gases, B.t.u.	1468	1232	1656	1029	1773	1423	1816	1227	1770	1167	1584	1390	1663
51	Heat lost by radiation from heater and smoke pipe, B.t.u.	696	638	600	801	633	669	646	805	609	618	626	577	549
52	Heat lost due to unconsumed gaseous combustible matter, B.t.u.	0	0	0	0	0	0	0	0	0	0	0	0	0
53	Heat lost due to unconsumed combustible in soot, B.t.u.	}												
54	Heat lost due to convection and unaccounted losses, B.t.u.	3870	4194	3227	3365	2800	3537	3392	3231	3869	4351	3965	4415	4500
55	Total heat value of fuel as fired, B.t.u. per pound	19935	19935	19935	19935	19935	19935	19935	19936	19935	19935	19935	19935	19935
	HEAT BALANCE, PER CENT HEAT IN FUEL AS FIRED—													
56	Heat imparted to tank water, (thermal efficiency) per cent	62.3	62.4	65.2	66.9	66.8	64.7	63.7	66.7	61.5	62.1	61.9	60.8	59.1
57	Heat lost due to moisture content of fuel, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	Heat lost due to water vapor formed in burning hydrogen, per cent	7.2	7.0	7.0	6.9	7.0	7.0	6.8	6.8	7.0	7.0	7.0	7.1	7.1
59	Heat lost due to moisture in air used for combustion, per cent	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1	0.2
60	Heat carried away by dry chimney gases, per cent	7.4	6.2	8.3	5.2	8.9	7.1	9.1	6.2	8.9	5.8	7.9	7.0	8.3
61	Heat lost by radiation from heater and smoke pipe, per cent	3.5	3.2	3.0	4.1	3.2	3.4	3.2	4.0	3.0	3.1	3.1	2.9	2.8
62	Heat lost due to unconsumed gaseous combustible matter, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	Heat lost due to unconsumed combustible in soot, per cent	}												
64	Heat lost due to convection and unaccounted losses, per cent	19.4	21.0	16.3	16.8	14.0	17.7	17.1	16.2	19.4	21.9	20.0	22.1	22.5
65	Total heat value of fuel as fired, per pound	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	ELECTRIC POWER, A. C.—													
	Watts	121	124	123	124	124	121	123	121	130	133	132	139	139

INVESTIGATION OF DOMESTIC OIL BURNERS—TABLE 2-A: LOG OF TEST DATA

Item No.	ITEMS AND UNITS:							
1	Test number	407	408	409	410	415	416	417
2	Date	3-31-25	3-31-25	4-1-25	4-1-25	4-2-25	4-2-25	4-3-25
3	Duration of test—hours	1	1	1	1	1	1	1
4	Heater used, number of sections	4	4	4	4	4	4	4
5	Fuel, kind and sample number	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2
	RATES—							
6	Fuel burned, pounds per hour	14.71	11.37	9.05	7.65	14.37	11.37	6.42
7	Fuel burned, gallons, per hour	2.067	1.597	1.272	1.075	2.019	1.597	0.902
	DRAFT—							
8	Base of flue, inches of water	0.070	0.073	0.075	0.065	0.068	0.044	0.031
9	Combustion chamber, inches of water	0.047	0.046	0.052	0.047	0.044	0.033	0.049
10	Ash pit, inches of water	.....	.....	.....	.....	.....	.....	.....
	TEMPERATURES—							
11	Cooling water outlet, T. C. No. 1	85	91	89	123	80	82	123
12	Cooling water inlet, T. C. No. 2	51	51	52	54	50	50	53
13	Tank water inlet, left, T. C. No. 3	151	156	137	148	163	155	170
14	Tank water inlet, right, T. C. No. 4	151	156	137	148	162	155	170
15	Water, top section of heater, T. C. No. 5	156	160	140	151	169	160	173
16	Tank water outlet, left, T. C. No. 6	123	134	118	135	136	132	151
17	Tank water outlet, right, T. C. No. 7	123	135	118	136	137	133	152
18	Water, boiler inlet, left, T. C. No. 8	123	134	118	135	136	132	151
19	Water, boiler inlet, right, T. C. No. 9	123	134	118	135	136	132	151
20	Ash pit surface, right, T. C. No. 10	76	82	69	73	87	84	92
21	Ash pit surface, left, T. C. No. 11	77	83	70	74	88	86	96
22	Surface firepot section, right, T. C. No. 12	116	123	106	119	125	126	136
23	Surface firepot section, left, T. C. No. 13	121	129	112	126	132	128	143
24	Surface shallow intermediate section, right, T. C. No. 14	140	143	125	133	149	142	156
25	Surface shallow intermediate section, left, T. C. No. 15	148	150	133	141	157	150	160
26	Surface, top section, right, T. C. No. 16	145	149	131	138	155	147	157
27	Surface, top section, left, T. C. No. 17	155	156	137	144	164	156	159
28	Surface, deep intermediate section, right, T. C. No. 18	.....	.....	.....	.....	.....	.....	.....
29	Surface, deep intermediate section, left, T. C. No. 19	.....	.....	.....	.....	.....	.....	.....
30	Fuel, T. C. No. 20	73	72	68	69	68	69	71
31	Surface smoke pipe, T. C. No. 21	273	242	208	198	280	258	178
32	Flue gas, T. C. No. 22	692	629	561	524	692	638	461
33	Air to ash pit, T. C. No. 23	72	73	65	68	74	73	71
	FLUE GAS ANALYSIS—							
34	Carbon dioxide, per cent by volume	5.8	4.2	3.0	2.6	5.5	5.3	4.5
35	Oxygen per cent by volume	13.3	15.5	16.5	17.3	13.7	14.3	15.1
36	Carbon monoxide per cent by volume	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	Nitrogen, per cent by volume (difference)	80.9	80.3	80.5	80.1	80.8	80.4	80.4
	PSYCHROMETER READINGS—							
38	Wet bulb	60	61	54	54	55	58	59
39	Dry bulb	73	72	68	69	68	69	71
	QUANTITIES—							
40	Cooling water passed through cooler, pounds per hour	2714	2625	1852	401	4150	3306	1323
	Heat in boiler and tank water:							
41	Beginning of test, B.t.u.	86351	119256	101077	105568	121088	117876	138926
42	End of test, B.t.u.	123754	115104	97958	120052	122124	113736	125538
43	Heat added to boiler and tank water, net B.t.u. per hour	37403	—4152	—3119	14484	1036	—4140	—13390
44	Heat removed by cooling water, net B.t.u. per hour	92167	104869	66580	27609	124376	105693	91088
45	Heat imparted to tank water, net B.t.u. per hour	129570	100717	63461	42093	125412	101553	77698
	HEAT BALANCE PER POUND OF FUEL AS FIRED—							
46	Heat imparted to tank water, B.t.u.	8808	8858	7012	5502	8727	8931	12101
47	Heat lost due to moisture content of fuel, B.t.u.	0	0	0	0	0	0	0
48	Heat lost due to water vapor formed in burning hydrogen, B.t.u.	1541	1509	1478	1457	1546	1517	142
49	Heat lost due to moisture in air used for combustion, B.t.u.	80	108	87	87	66	77	6
50	Heat carried away by dry chimney gases, B.t.u.	5298	6546	8069	8583	5626	5323	433
51	Heat lost by radiation from heater and smoke pipe, B.t.u.	311	368	338	430	375	408	56
52	Heat lost due to unconsumed gaseous combustible matter, B.t.u.	0	0	0	0	0	0	
53	Heat lost due to unconsumed combustible in soot, B.t.u.	}						
54	Heat lost due to convection and unaccounted losses, B.t.u.	3198	1847	2252	3187	2896	2980	75
55	Total heat value of fuel as fired, B.t.u. per pound	19236	19236	19236	19236	19236	19236	19236
	HEAT BALANCE, PER CENT HEAT IN FUEL AS FIRED—							
56	Heat imparted to tank water, (thermal efficiency) per cent	45.8	46.0	36.4	28.6	45.4	46.4	62.
57	Heat lost due to moisture content of fuel, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.
58	Heat lost due to water vapor formed in burning hydrogen, per cent	8.0	7.8	7.7	7.6	8.0	7.9	7.
59	Heat lost due to moisture in air used for combustion, per cent	0.4	0.6	0.4	0.4	0.3	0.4	0.
60	Heat carried away by dry chimney gases, per cent	27.5	34.0	41.9	44.6	29.3	27.7	22.
61	Heat lost by radiation from heater and smoke pipe, per cent	1.6	1.9	1.8	2.2	1.9	2.1	2.
62	Heat lost due to unconsumed gaseous combustible matter, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.
63	Heat lost due to unconsumed combustible in soot, per cent	}						
64	Heat lost due to convection and unaccounted losses, per cent	16.7	9.7	11.8	16.6	15.2	15.5	4.
65	Total heat value of fuel as fired, per pound	100.0	100.0	100.0	100.0	100.0	100.0	100.
	ELECTRIC POWER, D. C.—							
66	Volts	108.8	109.2	109.8	110.6	109.3	109.7	109.
67	Amperes	1.6	1.3	1.1	1.1	1.7	1.4	1.
68	Watts	174	142	121	122	186	154	121

FOR BURNER A—1925

[*FO—Furnace Oil]

496	497	498	499	500	501	502	503	504	505	506
5-28-25	6-2-25	6-2-25	6-2-25	6-3-25	6-8-25	6-10-25	6-10-25	6-11-25	6-11-25	6-12-25
.75	1	.83	.67	.50	1	1	.67	.50	1	.50
6	6	6	6	6	6	6	6	6	6	6
*FO 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3
19.39	12.43	14.16	16.95	19.04	14.31	15.61	18.86	19.54	13.58	19.28
2.786	1.726	1.967	2.354	2.645	1.988	2.243	2.710	2.808	1.961	2.770
0.041	0.001	0.031	0.031	0.034	0.026	0.036	0.051	0.035	0.042	0.016
0.041	0.002	0.035	0.032	0.031	0.031	0.035	0.033	0.026	0.049	0.020
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
87	108	92	87	87	94	90	92	90	95	91
60	66	65	65	65	69	72	72	71	71	69
171	159	178	170	174	171	162	168	170	177	169
170	158	177	169	172	170	160	167	169	176	168
171	159	178	169	175	173	162	170	170	177	169
135	127	142	132	129	138	125	132	136	141	129
134	127	143	131	129	138	125	131	126	142	129
134	128	143	132	130	139	126	132	127	142	130
135	128	143	132	130	139	126	132	127	142	130
352	291	338	312	287	334	276	265	264	309	355
345	294	369	309	293	338	280	276	258	309	341
130	125	139	130	129	135	122	128	120	134	127
135	128	143	134	132	139	127	132	128	140	132
130	125	137	132	135	136	128	132	126	130	129
161	149	167	159	162	161	152	160	159	162	157
159	149	167	158	162	161	152	160	156	162	155
158	152	167	160	165	161	153	161	157	162	157
117	116	128	121	122	126	117	120	112	115	118
151	141	156	149	151	151	142	149	147	153	148
75	76	80	81	79	86	81	85	70	73	70
258	208	227	254	269	231	250	291	287	234	261
441	348	376	427	468	386	421	491	491	376	448
109	100	119	90	88	94	87	90	78	84	88
11.0	10.7	9.7	10.0	10.0	10.0	9.8	8.9	10.0	9.3	13.0
5.4	5.9	7.4	6.9	6.8	6.8	7.3	8.1	7.0	7.9	2.7
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
83.6	83.4	82.9	83.1	83.2	83.2	82.9	83.0	83.0	82.8	84.3
64	71	73	74	75	78	69	71	62	63	63
75	76	80	81	79	86	81	85	70	73	70
5457	1614	6510	6056	6670	5732	5548	6448	6758	6433	5648
130460	108254	149716	139705	141385	144005	109202	127139	132573	158524	129328
196392	183549	183416	180794	181189	188320	183773	190688	180398	184516	185730
87909	78295	16440	61634	79608	44325	74571	95324	95650	25992	112804
147131	67611	175379	132978	146572	143014	117602	128648	128130	154006	145990
235040	142906	191819	194612	226080	187339	192173	223971	223780	179998	258794
12124	11497	13547	11481	11874	13091	12310	11878	11452	13254	13425
0	0	0	0	0	0	0	0	0	0	0
1421	1370	1380	1406	1430	1378	1403	1436	1453	1388	1430
32	38	47	55	67	55	41	57	41	31	30
1664	1287	1539	1747	1964	1515	1727	2263	2098	1619	1464
552	612	719	535	472	554	498	453	441	659	567
0	0	0	0	0	0	0	0	0	0	0
4142	4917	2489	4497	3914	3028	3956	3848	4450	2984	3021
19935	19721	19721	19721	19721	19721	19935	19935	19935	19935	19935
60.8	58.3	68.7	58.2	60.2	66.4	61.7	59.6	57.4	66.5	67.3
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.1	6.9	7.0	7.1	7.2	7.0	7.0	7.2	7.3	7.0	7.2
0.2	0.2	0.2	0.3	0.3	0.3	0.2	0.3	0.2	0.2	0.2
8.3	6.5	7.8	8.8	10.0	7.7	8.7	11.3	10.5	8.1	7.3
2.8	3.1	3.6	3.7	2.4	3.3	2.5	2.3	2.2	3.3	2.8
0.0	0.0	0.0	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20.8	25.0	12.7	22.9	19.9	15.3	19.9	19.3	22.4	14.9	15.2
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
140	126	126	132	140	127	134	144	151	130	148

FOR BURNER B—1925

[*FO—Furnace Oil]

419	420	421	422	429	430	431	436	437	438	439
4-3-25	4-4-25	4-4-25	4-4-25	4-18-25	4-18-25	4-18-25	4-24-25	4-24-25	4-24-25	4-24-25
1	.833	1	1	1	1	1	1	1	1	1
4	4	4	4	4	4	4	4	4	4	4
Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 3	Dist. 3	Dist. 2	*FO 3	*FO 3	*FO 3	*FO 3
6.27	9.05	11.80	13.17	12.24	9.55	7.45	11.05	10.38	6.86	5.88
0.881	1.272	1.658	1.850	1.700	1.326	1.035	1.588	1.492	0.986	0.845
+0.002	+0.002	+0.002	+0.002	0.058	0.050	0.028	0.020	0.010	0.000	+0.002
0.019	0.017	0.017	0.017	0.041	0.050	0.036	0.040	0.030	0.020	0.017
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
117	139	97	90	93	93	91	90	102	99	93
53	57	50	50	59	59	59	62	60	61	61
164	170	168	157	157	158	144	153	178	169	158
164	170	168	157	157	158	144	153	178	169	158
166	172	171	160	162	161	148	157	180	171	161
144	151	144	135	134	136	124	128	153	148	139
145	152	146	136	135	137	124	129	154	149	140
144	151	144	135	134	136	124	128	153	148	139
144	151	144	135	134	136	124	128	153	148	139
92	78	92	96	76	87	83	85	104	106	105
96	80	96	97	80	92	87	87	109	111	107
132	133	130	123	121	125	115	121	141	137	130
139	142	138	130	129	132	120	128	150	143	136
145	149	149	142	144	143	133	143	162	153	146
156	160	156	148	152	152	140	151	170	161	152
153	153	153	146	149	149	137	146	166	158	150
154	158	156	149	155	153	142	151	169	160	152
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
72	65	67	70	72	74	75	79	81	83	83
176	164	149	145	269	231	216	224	216	194	192
424	444	424	421	665	576	527	552	513	458	421
72	66	67	69	68	68	68	75	82	84	83
9.2	11.2	9.7	9.1	5.1	4.8	4.4	9.7	10.3	9.3	9.6
8.5	4.2	3.6	3.3	13.5	14.4	15.0	7.2	6.3	7.9	7.9
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82.3	84.6	86.7	87.6	81.4	80.8	80.6	83.1	83.4	82.8	82.5
57	54	55	59	62	64	68	71	72	72	73
72	65	67	70	72	74	75	79	81	83	83
1224	491	2633	2577	2830	2840	2642	2855	2841	2669	2656
124506	112388	145799	125178	114062	125896	113101	89155	137247	140442	129100
126566	158350	127558	119834	123644	120566	108829	132623	146842	130867	121634
2060	55250	—18241	—5344	9582	—5330	—4272	43468	9595	—9575	—7466
78177	40157	123801	102951	96051	96390	84412	79798	119067	101209	84833
80237	95407	105560	97607	105633	91060	80140	123266	128662	91634	77367
12797	10544	8946	7411	8630	9535	10757	11155	12390	13358	13158
0	0	0	0	0	0	0	0	0	0	0
1401	1419	1407	1402	1543	1492	1466	1475	1452	1420	1401
23	21	24	32	104	102	128	68	60	55	51
1926	1708	1842	1920	5764	5187	5088	2429	2090	2007	1752
540	376	269	211	386	420	444	319	405	513	548
0	0	0	0	0	0	0	0	0	0	0
2549	5163	6748	8260	3294	2983	1828	4489	3538	2582	3025
19236	19236	19236	19236	19721	19721	19721	19935	19935	19935	19935
66.5	54.8	46.5	38.5	43.8	48.3	54.5	56.0	62.2	67.0	66.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.3	7.4	7.3	7.3	7.8	7.6	7.4	7.4	7.3	7.1	7.0
0.1	0.1	0.1	0.2	0.5	0.5	0.6	0.3	0.2	0.3	0.3
10.0	8.9	5.6	10.0	29.2	26.3	25.8	12.2	10.5	10.1	8.8
2.8	2.0	1.4	1.1	2.0	2.1	2.2	1.6	2.0	2.6	2.7
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13.3	26.8	35.1	42.9	16.7	15.2	9.5	22.5	17.7	12.9	15.2
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
110.3	110.3	110.2	110.2	110.9	110.1	110.8	111.7	111.0	111.4	111.2
1.2	1.3	1.5	1.6	1.6	1.3	1.3	1.6	1.5	1.3	1.2
132	143	165	176	177	143	144	179	166	145	133

be made of the test layout. Here is shown in diagrammatic fashion a burner installed for test in boiler 6-25-W. The test outfit was so constructed as to simulate a residential hot-water heating system, and at the same time permit the determination of the quantity of heat actually transmitted to the water in the system by the operation of the burner.

The direction of water flow is indicated by the arrows on Figure 1. What would ordinarily be the supply risers from the boiler are shown as heavy solid lines leading from the top of the boiler into the top of the "Cooling Tank" and the return lines are shown leading from the bottom of the tank to the return tappings of the boiler. Thus complete circulation of water is realized from the boiler up through the lines designated as "flow from boiler," down through the cooling tank and back to the boiler through the lines designated as "return to boiler." The system was filled with water up to about midway of the gage glass shown. The capacity of the boiler, piping and elevated tank was determined by calibration.

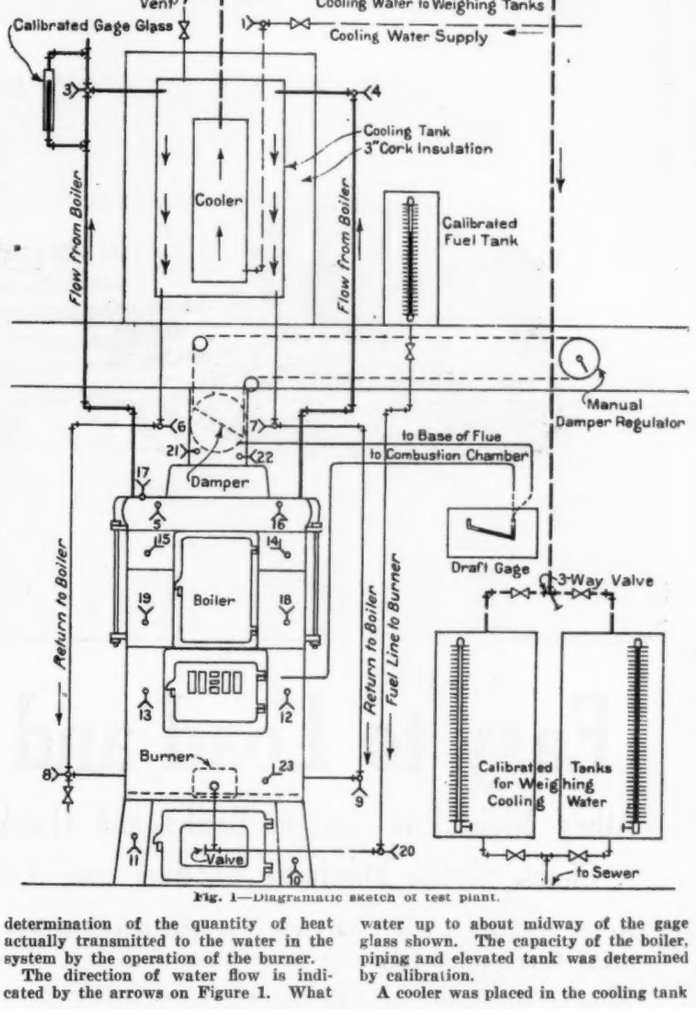


Fig. 1—Diagrammatic sketch of test plant.

A cooler was placed in the cooling tank in order to prevent the temperature of the water in the system from rising above approximately 180 degrees which would obviously be the case with the burner operating for an hour and heating a system which contains roughly only 1,200 lbs. of water and from which the radia-

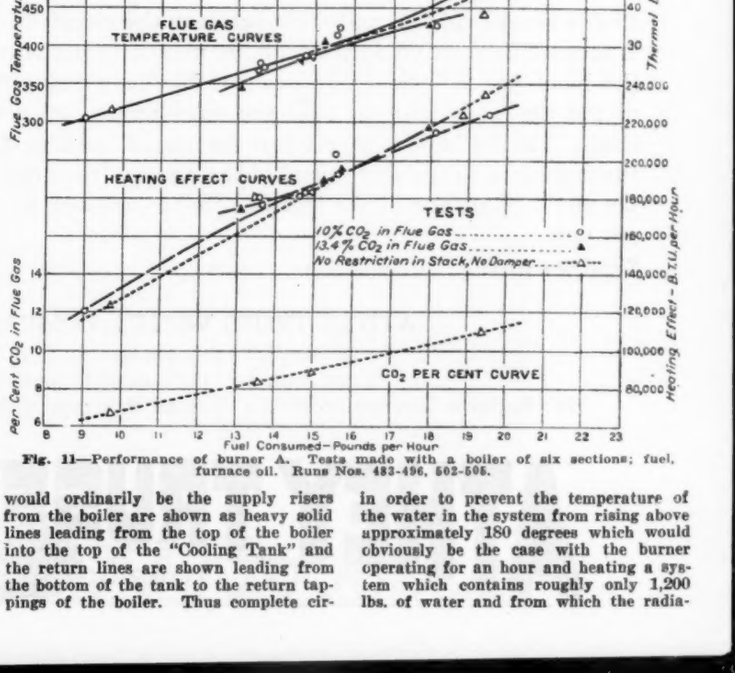
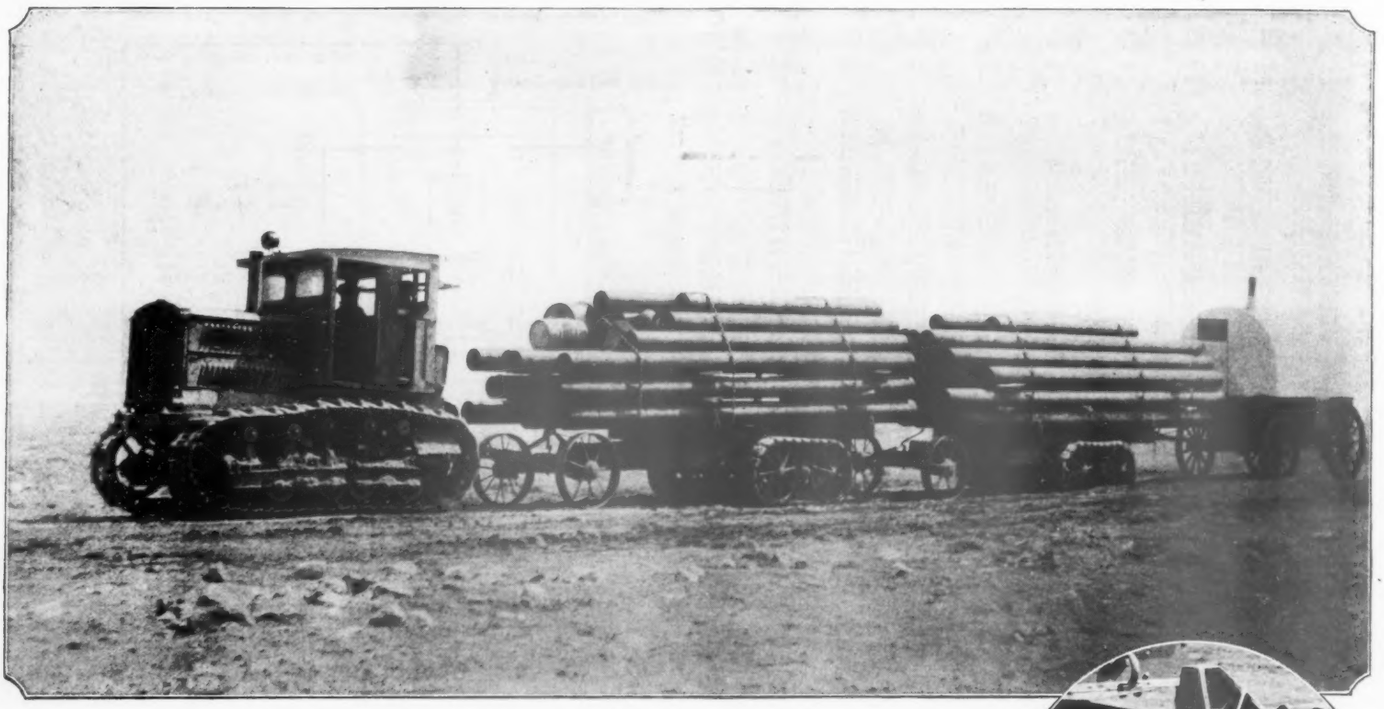
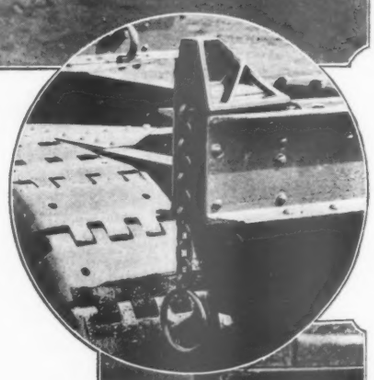
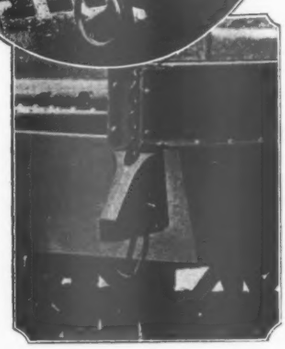

Fuel - Furnace Oil
BURNER A-1
6 Boiler Sections
EFFICIENCY CURVES
FLUE GAS TEMPERATURE CURVES
HEATING EFFECT CURVES
TESTS
10% CO2 in Flue Gas
13.4% CO2 in Flue Gas
No Restriction in Stack, No Damper
CO2 PER CENT CURVE
Flue Gas Temperature (F)
Thermal Efficiency - Per Cent
Per Cent CO2 in Flue Gas
Heating Effect - B.T.U. per Hour
Fuel Consumed - Pounds per Hour

Fig. 11—Performance of burner A. Tests made with a boiler of six sections; fuel, furnace oil. Runs Nos. 483-496, 502-505.







Easy to Load and Unload

Athey Rigid Box Section Bunks and Quick Acting Adjustable Chock Blocks Eliminate Loading and Unloading Troubles

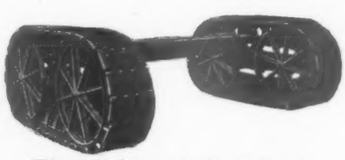
Athey wagons are not only easy to haul but they have special features which make them extremely easy to operate.

The load rests on wide rigid bunks of box girder construction. These bunks are mounted rigidly on main frame of wagon and give firm and ample support to skid poles in loading. No possible chance of bunks turning during loading process or shifting under load in transit. The bunks are equipped with special anchors for loading and binding chains. Stake pockets are built in the ends of the bunk for wood stakes.

Chock blocks ride on and slide between the channels of the bunks. The block is secured in position on the bunk by means of a chain which passes through the block and is locked into position by chain dropping into notched portion of the block. It may be unlocked even under strain by a simple toss of the chain. During loading operation the chock block is dropped over the end of the bunk and hangs on the end of the chain. It cannot be lost.

On short hauls the above features make possible an additional load or two per day.

Send for further information.



They Bridge the Soft Spots

ATHEY TRUSS WHEEL COMPANY
130 N. Wells St., Chicago, U. S. A.
Cable Address: "Trusswheel Chicago"
The Baldwin Locomotive Works, Foreign Representatives, Philadelphia, Pa.

ATHEY TRUSS WHEEL WAGON
IT BRIDGES THE SOFT SPOTS

74

Years of Service

With the passage of 1925, the Jarecki Manufacturing Company completes its seventy-fourth and begins its seventy-fifth year of service.

Viewing ourselves in retrospect, we feel both old and young: old in experience and judgment, but young in open-mindedness and in the acceptance of new ideas.

If there is any one truth that our seventy-four years has taught us, it is that the surest success is through the gate of service; and in 1926, as in all the preceding years, we dedicate ourselves to a continuance of the kind of dealings customers have come to expect from JARECKI since the days when high hats and trousers pantaloons were worn by the American gentleman's regular street attire.

This is the way folks dressed when the Jarecki Company was founded.

Jarecki

MANUFACTURING COMPANY

ERIE, PA., U.S.A.

ST. LOUIS PITTSBURGH EL DORADO TULSA EASTLAND

INVESTIGATION OF DOMESTIC OIL BURNERS—TABLE 2-A: LOG OF TEST DATA

Item No.	ITEMS AND UNITS:							
1	Test number	515	516	517	518	519	520	521
2	Date	6-26-25	6-26-25	6-26-25	6-26-25	6-27-25	6-29-25	6-30-25
3	Duration of test—hours	1	0.67	1	1	1	1	1
4	Heater used, number of sections	4	4	4	4	4	4	4
5	Fuel, kind and sample number	*FO 3	*FO 3	*FO 3	*FO 3	*FO 4	*FO 4	*FO 4
	RATES—							
6	Fuel burned, pounds per hour	12.20	12.10	8.76	11.92	8.10	12.99	12.95
7	Fuel burned, gallons per hour	1.753	1.739	1.259	1.714	1.167	2.016	2.010
	DRAFT—							
8	Base of flue, inches of water	+0.010	+0.003	+0.016	+0.010	+0.001	+0.002	+0.001
9	Combustion chamber, inches of water	0.003	0.009	0.000	0.000	+0.003	0.009	0.004
10	Ash pit, inches of water	.....	.....	.....	.....	.....	.....	.....
	TEMPERATURES—							
11	Cooling water outlet, T. C. No. 1	104	110	110	97	98	85	88
12	Cooling water inlet, T. C. No. 2	72	73	73	73	73	72	72
13	Tank water inlet, left, T. C. No. 3	161	172	171	173	148	152	161
14	Tank water inlet, right, T. C. No. 4	161	172	171	173	148	152	161
15	Water, top section of heater, T. C. No. 5	165	175	174	176	152	158	165
16	Tank water outlet, left, T. C. No. 6	136	146	149	146	128	124	133
17	Tank water outlet, right, T. C. No. 7	137	147	150	147	129	124	134
18	Water, boiler inlet, left, T. C. No. 8	136	146	149	146	128	124	133
19	Water, boiler inlet, right, T. C. No. 9	136	146	149	146	128	124	133
20	Ash pit surface, right, T. C. No. 10	260	258	287	328	254	242	269
21	Ash pit surface, left, T. C. No. 11	348	341	352	404	316	345	400
22	Surface firepot section, right, T. C. No. 12	130	137	140	139	122	120	131
23	Surface firepot section, left, T. C. No. 13	130	140	144	141	122	121	134
24	Surface shallow intermediate section, right, T. C. No. 14	151	169	167	169	139	146	153
25	Surface shallow intermediate section, left, T. C. No. 15	88	92	93	96	85	87	94
26	Surface, top section, right, T. C. No. 16	149	157	157	159	137	142	150
27	Surface, top section, left, T. C. No. 17	161	169	166	169	146	154	161
28	Surface, deep intermediate section, right, T. C. No. 18	.....	.....	.....	.....	.....	.....	.....
29	Surface, deep intermediate section, left, T. C. No. 19	.....	.....	.....	.....	.....	.....	.....
30	Fuel, T. C. No. 20	80	84	86	83	83	79	85
31	Surface smoke pipe, T. C. No. 21	216	212	181	204	170	235	216
32	Flue gas, T. C. No. 22	632	635	513	586	481	674	638
33	Air to ash pit, T. C. No. 23	78	80	86	86	81	78	87
	FLUE GAS ANALYSIS—							
34	Carbon dioxide, per cent by volume	10.2	9.6	9.6	13.1	9.2	10.1	13.3
35	Oxygen, per cent by volume	6.5	7.4	7.7	3.0	7.7	6.9	2.5
36	Carbon monoxide, per cent by volume	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	Nitrogen, per cent by volume (difference)	83.3	83.0	82.7	83.9	83.1	83.0	84.2
	PSYCHROMETER READINGS—							
38	Wet bulb	69	71	71	72	70	73	75
39	Dry bulb	75	78	81	81	76	77	79
	QUANTITIES—							
40	Cooling water passed through cooler, pounds per hour	2705	2477	2638	4660	2430	6778	6463
	Heat in boiler and tank water:							
41	Beginning of test, B.t.u.	96386	123776	135425	125894	99555	83383	94965
42	End of test, B.t.u.	140853	144966	136473	140720	120723	129761	138199
43	Heat added to boiler and tank water, net B.t.u. per hour	44467	31770	1048	14826	21168	46379	43234
44	Heat removed by cooling water, net B.t.u. per hour	86344	91383	97342	111561	63034	87911	106342
45	Heat imparted to tank water, net B.t.u. per hour	130811	123153	98390	126387	84202	134290	149576
	HEAT BALANCE PER POUND OF FUEL AS FIRED—							
46	Heat imparted to tank water, B.t.u.	10722	10174	11232	10594	10395	9599	10722
47	Heat lost due to moisture content of fuel, B.t.u.	0	0	0	0	0	0	0
48	Heat lost due to water vapor formed in burning hydrogen, B.t.u.	1516	1513	1444	1481	1564	1680	1644
49	Heat lost due to moisture in air used for combustion, B.t.u.	72	82	60	55	61	94	71
50	Heat carried away by dry chimney gases, B.t.u.	2724	2886	2239	1942	2190	2952	2977
51	Heat lost by radiation from heater and smoke pipe, B.t.u.	633	644	895	823	770	542	676
52	Heat lost due to unconsumed gaseous combustible matter, B.t.u.	0	0	0	0	0	0	0
53	Heat lost, due to unconsumed combustible in soot, B.t.u.							
54	Heat lost due to convection and unaccounted losses, B.t.u.	4268	4636	4065	5039	4622	4735	4412
55	Total heat value of fuel as fired, B.t.u. per pound	19935	19935	19935	19935	19602	19602	19602
	HEAT BALANCE, PER CENT HEAT IN FUEL AS FIRED—							
56	Heat imparted to tank water, (thermal efficiency) per cent	53.8	51.0	56.3	53.1	53.0	49.0	54.7
57	Heat lost due to moisture content of fuel, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	Heat lost due to water vapor formed in burning hydrogen, per cent	7.6	7.6	7.2	7.4	8.0	8.6	8.4
59	Heat lost due to moisture in air used for combustion, per cent	0.4	0.4	0.3	0.3	0.3	0.5	0.4
60	Heat carried away by dry chimney gases, per cent	13.6	14.5	11.2	9.7	11.2	15.1	10.6
61	Heat lost by radiation from heater and smoke pipe, per cent	3.2	3.2	4.5	4.1	3.9	2.8	3.4
62	Heat lost due to unconsumed gaseous combustible matter, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	Heat lost due to unconsumed combustible in soot, per cent							
64	Heat lost due to convection and unaccounted losses, per cent	21.4	23.3	20.5	25.4	23.6	24.0	22.5
65	Total heat value of fuel as fired, per pound	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	ELECTRIC POWER, A. C.—							
	Watts	69	65	62	65	63	78	75

INVESTIGATION OF DOMESTIC OIL BURNERS—TABLE 2-A: LOG OF TEST DATA

Item No.	ITEMS AND UNITS:													
1	Test number	454	455	456	457	458	459	460	461	462	463	464	†469	470	471
2	Date	5-5-25	5-5-25	5-6-25	5-6-25	5-6-25	5-6-25	5-8-25	5-8-25	5-11-25	5-11-25	5-12-25	5-13-25	5-14-25	5-14-25
3	Duration of test—hours	1	1	1	1	1	0.667	1	1	1	0.5	1	1	1	1
4	Heater used, number of sections	4	4	4	4	4	4	4	4	4	4	4	4	4	4
5	Fuel, kind and sample number	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	*FO 3	*FO 3	*FO 3
	RATES—														
6	Fuel burned, pounds per hour	9.67	14.60	13.99	18.30	18.24	17.66	10.42	13.30	20.20	21.30	9.35	16.04	16.88	17.66
7	Fuel burned, gallons per hour	1.343	2.028	1.943	2.542	2.534	2.453	1.447	1.847	2.806	2.945	1.299	2.305	2.282	2.529
	DRAFT—														
8	Base of flue, inches of water	+0.001	0.003	0.057	0.016	0.056	+0.001	+0.012	+0.001	0.057	0.000	0.060	0.004	0.055	0.055
9	Combustion chamber, inches of water	0.014	0.008	0.039	0.015	0.039	0.006	0.009	0.005	0.034	0.009	0.060	0.006	0.035	0.037
10	Ash pit, inches of water	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TEMPERATURES—														
11	Cooling water outlet, T. C. No. 1	111	95	91	82	83	83	92	103	87	88	91	80	86	99
12	Cooling water inlet, T. C. No. 2	60	59	59	59	59	59	59	59	63	63	64	63	63	63
13	Tank water inlet, left, T. C. No. 3	152	181	160	172	169	173	163	182	169	173	127	160	157	163
14	Tank water inlet, right, T. C. No. 4	152	181	160	172	169	173	163	182	169	173	127	160	157	163
15	Water, top section of heater, T. C. No. 5	155	186	166	179	175	179	166	186	175	178	132	166	164	170
16	Tank water outlet, left, T. C. No. 6	132	153	136	140	137	139	137	154	136	140	109	129	130	135
17	Tank water outlet, right, T. C. No. 7	133	154	137	140	138	140	138	155	137	141	109	130	131	136
18	Water boiler inlet, left, T. C. No. 8	132	153	136	139	137	139	137	154	136	140	109	129	130	135
19	Water boiler inlet, right, T. C. No. 9	132	153	136	139	137	139	137	154	136	140	109	129	130	135
20	Ash pit surface, right, T. C. No. 10	70	76	69	77	80	83	82	87	78	87	66	73	75	81
21	Ash pit surface, left, T. C. No. 11	79	91	80	91	95	97	94	97	87	99	69	83	86	92
22	Surface firepot section, right, T. C. No. 12	118	137	124	132	129	131	126	140	125	130	97	119	117	121
23	Surface firepot section, left, T. C. No. 13	125	145	132	138	136	137	134	149	123	137	97	119	117	121
24	Surface shallow intermediate section, right, T. C. No. 14	139	165	149	162	160	161	148	165	159	157	118	149	146	152
25	Surface shallow intermediate section, left, T. C. No. 15	147	173	156	170	168	170	155	174	168	168	124	157	155	162
26	Surface, top section, right, T. C. No. 16	142	169	152	165	163	164	151	170	162	160	124	152	145	151
27	Surface, top section, left, T. C. No. 17	148	176	161	172	171	171	158	179	175	169	133	168	166	171
28	Surface, deep intermediate section, right, T. C. No. 18	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
29	Surface, deep intermediate section, left, T. C. No. 19	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
30	Fuel, T. C. No. 20	63	67	66	71	71	74	70	71	73	73	68	71	69	73
31	Surface smoke pipe, T. C. No. 21	199	238	287	312	312	246	199	227	305	280	180	284	284	298
32	Flue gas, T. C. No. 22	582	710	716	777	795	719	561	689	839	692	592	762	777	812
33	Air to ash pit, T. C. No. 23	65	69	67	70	72	70	73	70	70	70	61	66	65	67
	FLUE GAS ANALYSIS—														
34	Carbon dioxide, per cent by volume	7.6	9.8	5.8	9.7	7.9	12.8	10.8	9.4	8.7	12.7	2.4	10.2	6.5	7.5
35	Oxygen, per cent by volume	10.6	7.9	13.2	7.6	10.0	3.5	5.8	8.2	9.1	1.2	16.1	6.7	11.9	10.7
36	Carbon monoxide, per cent by volume	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	0.0
37	Nitrogen, per cent by volume (difference)	81.8	82.3	81.0	82.7	82.1	83.7	83.4	82.4	82.2	85.0	80.5	83.1	81.6	81.8
	PSYCHROMETER READINGS—														
38	Wet bulb	57	58	58	61	61	62	58	60	70	70	62	64	61	63
39	Dry bulb	63	67	66	71	71	74	70	71	72	73	68	71	69	72
	QUANTITIES—														
40	Cooling water passed through cooler, pounds per hour	755	3711	3315	6250	5952	6043	3423	3031	5241	4392	1438	6146	4215	4156
	Heat in boiler and tank water:														
41	Beginning of test, B.t.u.	89407	137632	115968	110654	113848	115119	119776	139914	90838	112993	82336	98216	101387	98216
42	End of test, B.t.u.	141517	151528	128737	145777	137246	144984	130376	148413	149967	146796	97078	130941	129884	141511
43	Heat added to boiler and tank water, net B.t.u. per hour	52110	13895	12769	35123	23398	44798	10600	8499	59129	67606	14742	32725	28497	43295
44	Heat removed by cooling water, net B.t.u. per hour	38416	133336	105914	143562	142670	144562	112919	133092	125575	109580	38485	104297	96777	113005
45	Heat imparted to tank water, net B.t.u. per hour	90525	147231	118683	178685	166068	189660	123519	141591	184704	177186	53227	137022	125274	156300
	HEAT BALANCE PER POUND OF FUEL AS FIRED—														
46	Heat imparted to tank water, B.t.u.	9361	10084	8483	9764	9104	10742	11854	10645	9144	8358	5693	8542	7888	8823
47	Heat lost due to moisture content of fuel, B.t.u.	0	0	0	0	0	0	0	0	0	0	0	0	0	0
48	Heat lost due to water vapor formed in burning hydrogen, B.t.u.	1510	1573	1577	1604	1613	1570	1490	1557	1634	1556	1509	1596	1606	1621
49	Heat lost due to moisture in air used for combustion, B.t.u.	55	51	90	64	79	48	34	53	127	67	152	72	99	94
50	Heat carried away by dry chimney gases, B.t.u.	3427	3313	5580	3673	4594	2571	2301	3316	4428	2288	7603	3383	5362	4875
51	Heat lost by radiation from heater and smoke pipe, B.t.u.	364	336	390	344	339	263	351	353	286	250	245	316	320	314
52	Heat lost due to unconsumed gaseous combustible matter, B.t.u.	0	0	0	0	0	0	0	0	0	813	0	0	0	0
53	Heat lost due to unconsumed combustible in soot, B.t.u.														
54	Heat lost due to convection and unaccounted losses, B.t.u.	5004	4364	3601	4272	4002	4527	3691	3798	4101	6389	4519	6026	4660	4208
55	Total heat value of fuel as fired, B.t.u. per pound	19721	19721	19721	19721	19721	19721	19721	19721	19721	19721	19721	19935	19935	19935
	HEAT BALANCE, PER CENT HEAT IN FUEL AS FIRED—														
56	Heat imparted to tank water, (thermal efficiency), per cent	47.5	51.1	43.0	49.5	46.2	54.5	60.1	54.0	46.4	42.4	28.9	42.8	39.6	44.3
57	Heat lost due to moisture content of fuel, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	Heat lost due to water vapor formed in burning hydrogen, per cent	7.6	8.0	8.0	8.1	8.2	8.0	7.6	7.9	8.3	7.9	7.6	8.0	8.0	8.1
59	Heat lost due to moisture in air used for combustion, per cent	0.3	0.3	0.4	0.3	0.4	0.2	0.2	0.3	0.6	0.3	0.8	0.4	0.5	0.5
60	Heat carried away by dry chimney gases, per cent	17.4	16.8	28.3	18.6	23.3	13.0	11.7	16.8	22.4	11.6	38.5	17.0	26.9	24.4
61	Heat lost by radiation from heater and smoke pipe, per cent	1.8	1.7	2.0	1.7	1.7	1.3	1.8	1.8	1.4	1.3	1.2	1.6	1.6	1.6
62	Heat lost due to unconsumed gaseous combustible matter, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.1	0.0	0.0	0.0	0.0
63	Heat lost due to unconsumed combustible in soot, per cent														
64	Heat lost due to convection and unaccounted losses, per cent	25.4	22.1	18.3	21.8	20.2	23.0	18.6	19.2	20.9	32.4	23.0	30.2	23.4	21.1
65	Total heat value of fuel as fired, per pound	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	ELECTRIC POWER, D. C.—														
66	Volts	111.6	111.0	111.7	112.1	111.9	110.9	112.4	112.2	104.6	114.4	113.5	113.3	112.4	112.1
67	Amperes	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.6	0.5	0.4	0.4	0.4	0.4
68	Watts	44.6	44.4	44.7	44.8	44.8	44.4	45.0	44.9	62.7	57.2	45.4	45.3	45.0	44.8

FOR BURNER A—1925

[*FO—Furnace Oil]

	522	523	524	525	528	529	530	531	532	533	534
	7-2-25	7-3-25	7-6-25	7-6-25	7-9-25	7-9-25	7-9-25	7-13-25	7-13-25	7-13-26	7-14-25
	1	1	1	1	1	1	1	1	1	0.67	1
	4	4	4	4	4	4	4	4	4	4	4
	*FO 4	*FO 4	*FO 4	*FO 4	*FO 4	*FO 4	*FO 4	*FO 4	*FO 4	*FO 4	*FO 4
	10.88	10.60	11.88	13.92	12.15	10.55	8.76	10.92	12.09	14.07	11.45
	1.568	1.527	1.712	2.006	1.751	1.520	1.262	1.574	1.742	2.027	1.650
	+0.007	+0.020	+0.018	+0.009	+0.020	+0.027	0.008	0.005	0.004	0.003	0.009
	0.013	+0.003	0.000	0.040	0.000	+0.010	0.024	0.018	0.017	0.013	0.019
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	93	92	85	89	99	95	93	92	96	97	93
	73	73	73	75	77	80	80	79	80	80	80
	145	169	152	162	160	165	153	151	165	172	157
	145	169	152	162	160	165	153	151	165	172	157
	150	173	157	169	164	169	156	157	170	176	162
	121	143	125	135	135	140	132	128	140	144	133
	121	144	125	136	136	141	133	129	141	145	134
	121	143	125	135	135	140	132	128	140	144	133
	121	143	125	135	135	140	132	128	140	144	133
	268	330	291	323	302	323	269	265	294	312	284
	355	407	390	417	400	404	330	352	376	397	366
	117	137	125	133	132	139	129	124	136	139	129
	119	139	124	135	132	139	129	126	137	141	131
	139	157	147	157	153	158	146	145	156	161	151
	86	93	89	96	125	137	143	141	152	160	147
	136	153	141	151	147	153	142	140	151	156	145
	145	166	151	160	154	162	151	151	163	170	156
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	78	85	85	89	85	89	88	84	86	88	83
	193	193	213	220	204	199	188	.....	.....	.....	.....
	580	556	589	632	592	536	530	580	604	641	595
	76	85	83	90	86	93	87	83	87	93	85
	10.0	11.7	12.8	13.2	13.1	12.9	7.7	9.3	10.2	11.7	9.3
	7.0	4.9	3.3	2.7	3.2	3.1	10.3	8.1	6.9	4.8	8.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	83.0	83.4	83.9	84.1	83.7	84.0	82.0	82.6	82.9	83.5	82.7
	69	69	77	78	74	76	77	73	75	75	69
	74	78	80	83	77	78	78	80	82	82	76
	3135	5722	7593	7038	3478	6247	6096	4518	5763	5648	6373
	75949	128583	90151	97473	90237	118584	112352	88148	111300	116545	100620
	127528	131748	124705	137283	141624	132174	119698	127974	138595	147014	130999
	51579	8165	34554	39810	51387	13640	7346	39826	27295	45704	30397
	62544	114154	90889	93221	76307	93455	79065	63071	91978	101420	82667
	114123	117319	125443	138131	127694	107095	86411	102897	119273	147134	113036
	10481	11068	10559	9923	10510	10151	9864	9423	9865	10457	9872
	0	0	0	0	0	0	0	0	0	0	0
	1626	1603	1623	1642	1624	1587	1585	1619	1630	1649	1629
	68	52	74	79	66	65	111	82	84	78	73
	2526	2048	2005	2100	1985	1791	2906	2678	2557	2400	2779
	662	920	720	717	760	926	817	538	581	568	586
	0	0	0	0	0	0	0	0	0	0	0
	4239	3911	4621	5141	4657	5082	4319	5262	4885	4460	4663
	19602	19602	19602	19603	19602	19602	19602	19603	19602	19602	19602
	53.5	56.5	53.9	50.6	53.6	51.8	50.3	48.1	50.3	53.3	50.4
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	8.2	8.2	8.3	8.4	8.3	8.1	8.1	8.2	8.3	8.4	8.3
	0.3	0.3	0.4	0.4	0.3	0.3	0.6	0.4	0.4	0.4	0.4
	12.9	10.4	10.2	10.7	10.1	9.1	14.8	13.7	13.0	12.2	14.2
	3.4	4.7	3.7	3.6	3.9	4.7	4.2	2.7	3.0	2.8	3.0
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	21.6	19.9	23.5	26.3	23.8	26.0	22.0	26.9	25.0	22.9	23.7
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	67	65	65	73	59	57	57	65	64	74	72

FOR BURNER C—1925

[*FO—Furnace Oil] [†Data unreliable]

	†472	473	474	475	476	477	478	479	507	508	509
	5-14-25	5-19-25	5-19-25	5-19-25	5-19-25	5-20-25	5-20-25	5-20-25	6-15-25	6-15-25	6-15-25
	1	1	1	1	1	1	0.833	0.5	0.5	0.75	0.667
	4	4	4	4	4	4	4	4	4	4	4
	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3	*FO 3
	16.07	9.92	9.76	12.84	12.96	17.14	19.80	19.64	19.04	15.71	15.80
	2.309	1.426	1.402	1.845	1.862	2.463	2.845	2.822	2.736	2.258	2.270
	0.014	0.055	+0.007	0.056	+0.008	0.058	0.058	0.023	0.030	0.006	0.007
	0.012	0.041	0.010	0.039	0.005	0.038	0.034	0.019	0.022	0.011	0.011
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	92	95	110	104	88	88	94	92	89	93	92
	63	64	64	64	64	64	65	65	72	72	73
	170	140	171	165	172	155	180	172	165	168	164
	170	140	171	165	172	155	180	172	165	168	164
	175	145	173	171	177	162	187	178	171	173	169
	139	122	147	143	143	129	149	140	132	137	134
	140	122	148	144	144	130	150	141	133	138	135
	139	122	147	143	143	129	149	140	132	137	134
	139	123	147	143	143	129	149	140	132	137	134
	83	70	78	87	70	85	90	78	90	90	94
	95	75	92	96	96	75	93	97	84	99	193
	127	111	139	130	133	120	137	132	125	131	127
	127	111	133	130	133	118	136	129	126	131	128
	156	131	153	152	158	148	167	162	157	159	156
	166	138	163	161	166	156	177	172	88	88	89
	154	132	152	152	156	145	165	159	156	155	152
	173	143	165	168	173	164	186	177	173	172	168
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	71	72	74	76	75	71	76	78	79	83	83
	231	231	208	265	250	302	309	291	305	254	258
	769	610	564	710	704	800	859	830	806	733	733
	67	65	67	69	69	68	70	70	74	77	78
	9.3	3.6	9.7	5.1	9.3	6.8	7.9	10.2	10.0	10.3	9.8
	8.1	15.8	7.3	13.9	8.3	11.2	9.9	6.6	6.8	7.1	7.4
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	82.6	80.6	83.0	81.0	82.4	82.0	82.2	83.2	83.2	82.6	82.8
	61	62	64	63	66	62	65	63	76	77	79
	71	72	74	76	75	71	76	78	79	83	83
	3843	2013	1896	2262	5246	3822	4693	4594	6392	6031	6024
	107708	100908	120864	120864	136623	88567	121209	111724	99853	104006	101924
	142568	108251	143998	134530	130322	134913	153914	146518	137277	139369	137277
	34860	7343	23134	13666	—6301	46346	39246	69588	74848	47151	53030
	111217	62262	87007	90276	149591	91537	135821	123762	108408	126341	114164
	146077	69605	110141	103942	143290	137883	175067	193350	183256	173492	167184
	9090	7017	11285	8095	11056	8044	8842	9845	9625	11045	10584
	0	0	0	0	0	0	0	0	0	0	0
	1600	1514	1487	1562	1560	1616	1642	1624	1610	1566	1566
	64	140	50	108	52	98	100	63	130	112	130
	3732	7279	2514	6089	3363	5280	4903	3676	3621	3150	3203
	348	345	388	374	358	316	329	278	280	267	268
	0	0	0	0	0	0	0	0	0	0	0
	5101	3640	4211	3707	3546	4581	4119	4449	4669	3795	4084
	19935	19935	19935	19935	19935	19935	19935	19935	19935	19935	19935
	45.6	35.2	56.6	40.6	55.5	40.4	44.4	49.4	48.2	55.4	53.1
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	8.0	7.6	7.4	7.8	7.8	8.1	8.2	8.1	8.1	7.8	7.8
	0.3	0.7	0.2	0.5	0.3	0.5	0.5	0.3	0.6	0.6	0.6
	18.7	36.5	12.6	20.5	16.9	26.4	24.6	18.4	18.2	15.8	16.6
	1.7	1.7	1.9	1.9	1.8	1.6	1.6	1.4	1.4	1.3	1.3
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	25.7	18.2	21.3	18.7	17.7	23.0	20.7	22.4	23.5	19.1	20.6
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	111.6	111.3	111.7	110.7	111.2	111.7	112.4	111.4	107.8	111.0	110.9
	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.6
	55.8	44.5	44.7	44.3	44.5	44.7	45.0	55.7	53.9	66.6	66.5

tion is negligible. Thus the heat generated by the combustion of fuel in the boiler was absorbed in two ways: first, in heating the water in the tank system from its initial temperature to its final temperature, and, second, in heating the water which is passed through the cooler. In order to determine the magnitude of these quantities, the average temperatures of the water in the circulation system at the beginning and end of tests must be known together with the quantity of water in the system. Then, too, the quantity of water passed through the cooler must be determined, together with its temperature rise.

The temperatures at various points, 23 in number, were determined by means of thermo-couples. By reference to Figure 1 the location of these couples and their purpose can be seen.

The cooling water was measured in calibrated weighing tanks and controlled by valves in the line.

The cooling tank was covered with a 3-inch cork insulation in order to prevent heat losses, but the boiler was left bare. Surface temperatures were taken at various points on the boiler and smoke pipe in order to permit an estimate of the radiation loss.

The smoke pipe was fitted with a manually controlled damper and the draft intensities at the base of the flue and in the combustion chamber were measured with differential inclined draft gages.

A calibrated cylindrical fuel tank was used to determine the quantity of fuel supplied to the burner.

Determination of the power required to drive the burner unit was made by means of suitable instruments installed in the power line.

In general, the tests were of one hour's duration, except when it was deemed essential to run longer or when the water temperature became so high as to prevent continuing the operation of the burner. Frequently when operating the burner at high rates of fuel consumption the generated heat could not be dissipated rapidly enough by the cooling water to keep the temperature of the circulation

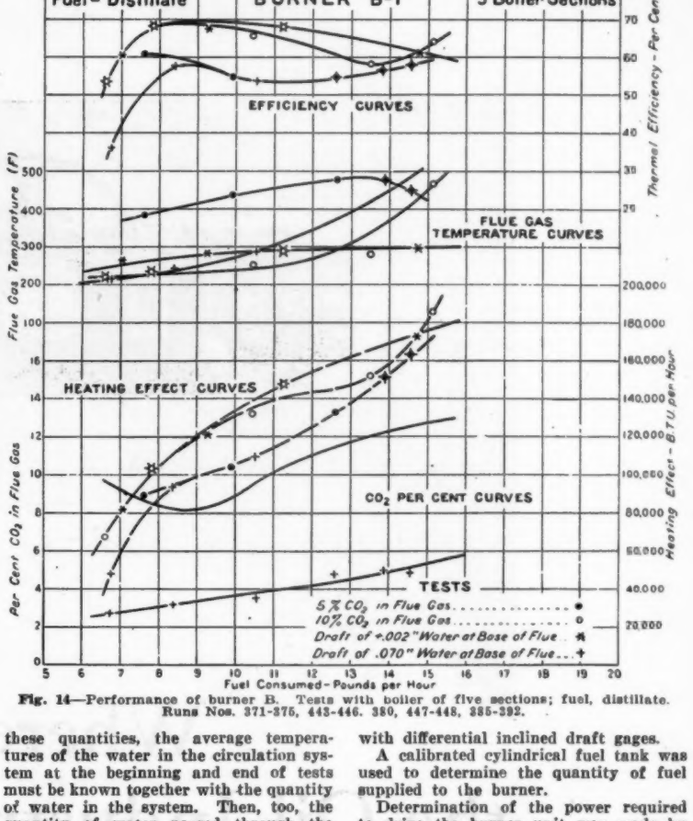

Fuel - Distillate
BURNER B-1
5 Boiler Sections
EFFICIENCY CURVES
FLUE GAS TEMPERATURE CURVES
HEATING EFFECT CURVES
CO2 PER CENT CURVES
TESTS
5 % CO2 in Flue Gas
10% CO2 in Flue Gas
Draft of +.002" Water at Base of Flue
Draft of .070" Water at Base of Flue
Thermal Efficiency - Per Cent
Flue Gas Temperature (F)
Per Cent CO2 in Flue Gas
Heating Effect - B.T.U. per Hour
Fuel Consumed - Pounds per Hour

Fig. 14—Performance of burner B. Tests with boiler of five sections; fuel, distillate. Runs Nos. 371-375, 443-446, 380, 447-448, 385-392.

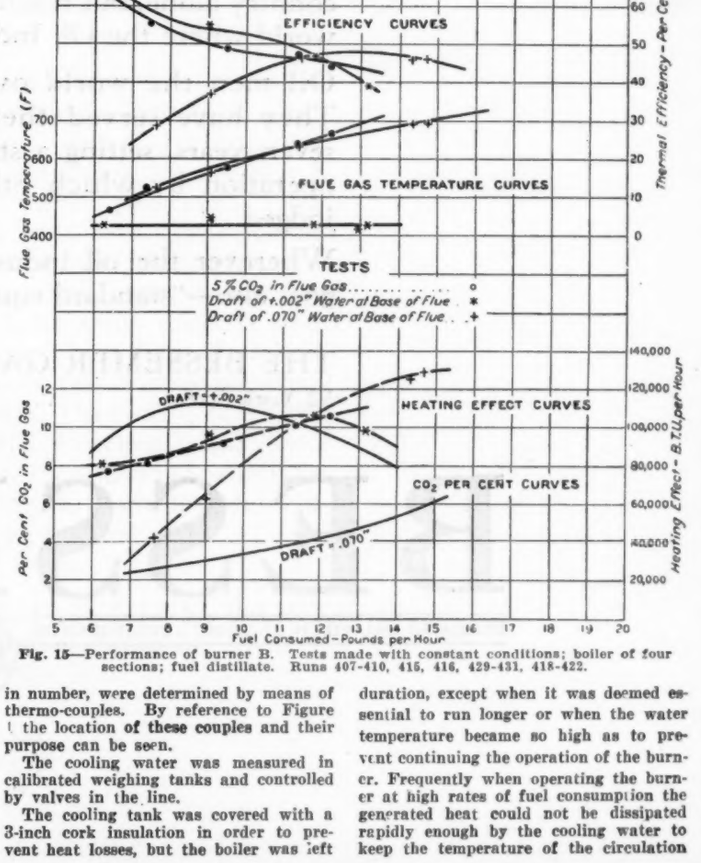
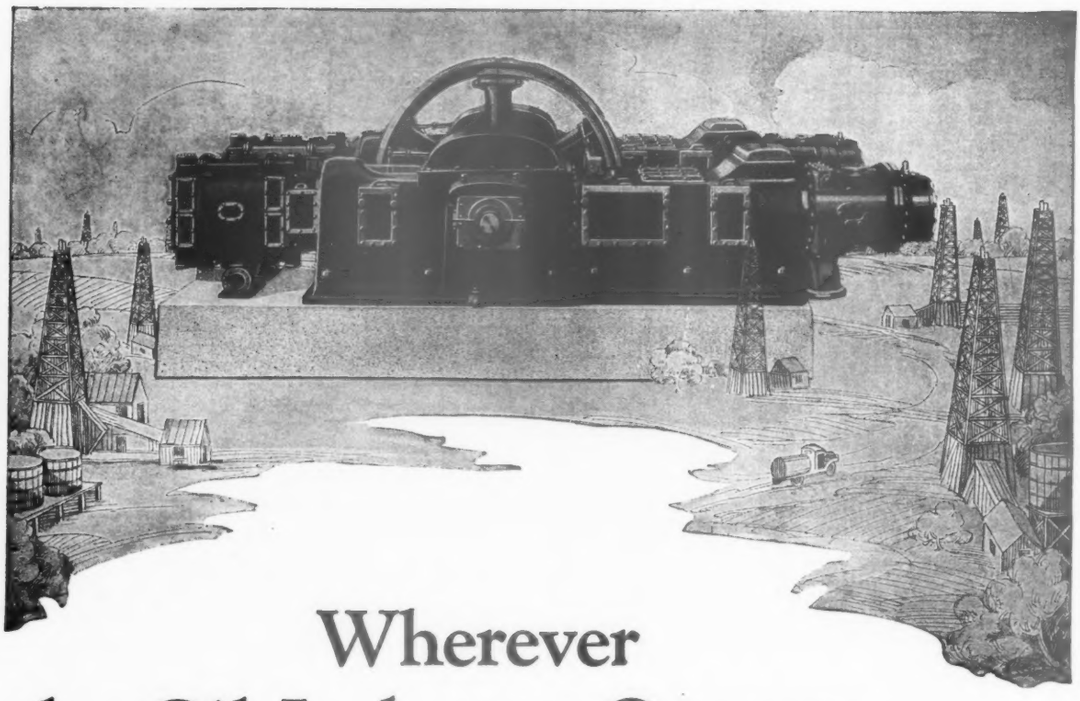

Fuel - Distillate
BURNER B-2
4 Boiler Sections
EFFICIENCY CURVES
FLUE GAS TEMPERATURE CURVES
TESTS
5 % CO2 in Flue Gas
Draft of +.002" Water at Base of Flue
Draft of .070" Water at Base of Flue
HEATING EFFECT CURVES
CO2 PER CENT CURVES
DRAFT +.002"
DRAFT .070"
Thermal Efficiency - Per Cent
Flue Gas Temperature (F)
Per Cent CO2 in Flue Gas
Heating Effect - B.T.U. per Hour
Fuel Consumed - Pounds per Hour

Fig. 15—Performance of burner B. Tests made with constant conditions; boiler of four sections; fuel distillate. Runs 407-410, 415, 416, 429-431, 418-422.



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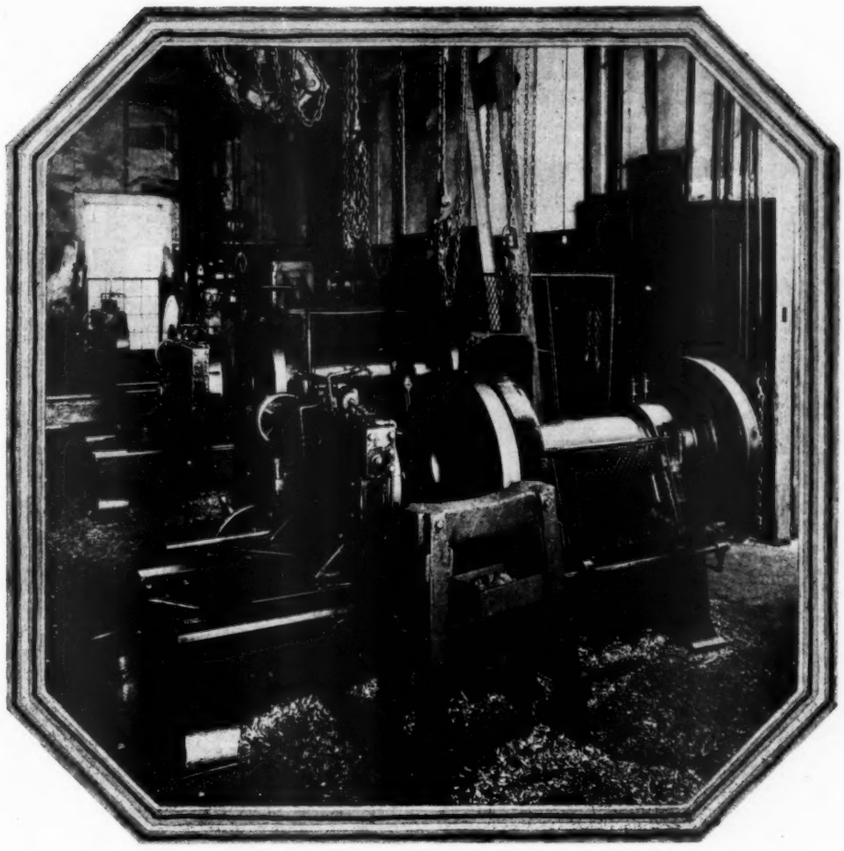

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O&GJ-1-14I-RTC

INVESTIGATION OF DOMESTIC OIL BURNERS—TABLE 2: LOG OF TEST DATA

Item No.	ITEMS AND UNITS:									
1	Test number	371	372	373	374	375	443	444	445	446
2	Date	2-21-25	2-21-25	2-24-25	2-24-25	3-5-25	3-5-25	3-5-25	3-6-25	3-6-25
3	Duration of test—hours	1.5	1	1	1	1	1	1.17	1	1
4	Heater used, number of sections	5	5	5	5	5	5	5	5	5
5	Fuel, kind and sample number	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2
	RATES—									
6	Fuel burned, pounds per hour	13.61	13.92	15.15	14.60	11.50	8.40	7.83	6.63	6.78
7	Fuel burned, gallons, per hour	1.913	1.956	2.129	2.052	1.616	1.181	1.100	0.932	0.953
	DRAFT—									
8	Base of flue, inches of water	0.010	0.063	0.002	0.077	0.018	0.072	0.00	0.00	0.069
9	Combustion chamber, inches of water	0.029	0.044	0.013	0.055	0.020	0.062	0.020	0.012	0.066
10	Ash pit, inches of water	.....	.....	.....	.....	.....	.....	.....	.....	.....
	TEMPERATURES—									
11	Cooling water outlet, T. C. No. 1	104	112	97	92	120	132	115	.....	.....
12	Cooling water inlet, T. C. No. 2	41	41	42	42	40	38	39	.....	.....
13	Tank water inlet, left, T. C. No. 3	176	181	186	170	188	172	167	167	158
14	Tank water inlet, right, T. C. No. 4	176	182	186	171	189	173	167	167	158
15	Water, top section of heater, T. C. No. 5	181	189	193	177	193	177	171	169	161
16	Tank water outlet, left, T. C. No. 6	147	150	151	138	160	149	144	151	145
17	Tank water outlet, right, T. C. No. 7	147	150	151	138	160	149	144	151	145
18	Water, boiler inlet, left, T. C. No. 8	147	150	151	138	160	149	144	151	145
19	Water, boiler inlet, right, T. C. No. 9	147	150	151	138	160	149	144	151	145
20	Ash pit surface, right, T. C. No. 10	84	81	79	79	81	79	80	71	74
21	Ash pit surface, left, T. C. No. 11	83	81	80	79	82	79	82	72	72
22	Surface firepot section, right, T. C. No. 12	136	140	139	131	148	136	133	137	129
23	Surface firepot section, left, T. C. No. 13	137	142	139	131	149	136	132	139	130
24	Surface shallow intermediate section, right, T. C. No. 14	.....	.....	.....	.....	.....	.....	.....	.....	.....
25	Surface shallow intermediate section, left, T. C. No. 15	.....	.....	.....	.....	.....	.....	.....	.....	.....
26	Surface, top section, right, T. C. No. 16	155	166	170	158	169	155	150	150	144
27	Surface, top section, left, T. C. No. 17	157	165	168	156	168	153	149	149	143
28	Surface, deep intermediate section, right, T. C. No. 18	149	153	157	146	159	144	141	145	136
29	Surface, deep intermediate section, left, T. C. No. 19	161	167	171	157	172	155	153	157	145
30	Fuel, T. C. No. 20	68	70	73	72	69	68	66	69	68
31	Surface smoke pipe, T. C. No. 21	199	293	307	279	222	215	203	192	199
32	Flue gas, T. C. No. 22	304	473	446	446	260	241	233	215	219
33	Air to ash pit, T. C. No. 23	77	76	74	73	76	73	73	70	69
	FLUE GAS ANALYSIS—									
34	Carbon dioxide, per cent by volume	7.4	5.0	10.2	4.8	7.3	3.2	9.1	9.7	2.7
35	Oxygen per cent by volume	7.6	13.5	6.0	13.9	10.5	16.4	8.6	8.1	16.9
36	Carbon monoxide per cent by volume	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	Nitrogen per cent by volume (difference)	85.0	81.5	83.8	81.3	82.2	80.4	82.3	82.2	80.4
	PSYCHROMETER READINGS—									
38	Wet bulb	59	62	63	65	62	62	56	54	54
39	Dry bulb	68	70	73	72	69	68	66	69	68
	QUANTITIES—									
40	Cooling water passed through cooler, pounds per hour	2224	2074	3201	2968	1319	1314	1339	0	0
	Heat in boiler and tank water:									
41	Beginning of test, B.t.u.	162153	169954	167497	147283	165629	171293	153587	122388	124561
42	End of test, B.t.u.	165464	173926	176434	161518	186341	154337	164214	190348	171688
43	Heat added to boiler and tank water, net B.t.u. per hour	2207	3372	5237	14235	20712	−16956	536	67960	47027
44	Heat removed by cooling water, net B.t.u. per hour	140090	147171	176087	148459	117272	110284	101721	0	0
45	Heat imparted to tank water, net B.t.u. per hour	142297	151143	185024	162694	137984	93328	102257	67960	47027
	HEAT BALANCE PER POUND OF FUEL AS FIRED—									
46	Heat imparted to tank water, B.t.u.	10457	10858	12366	11143	11999	11110	13104	10250	6936
47	Heat lost due to moisture content of fuel, B.t.u.	0	0	0	0	0	0	0	0	0
48	Heat lost due to water vapor formed in burning hydrogen, B.t.u.	1343	1429	1422	1413	1318	1309	1308	1295	1293
49	Heat lost due to moisture in air used for combustion, B.t.u.	25	27	37	25	26	5	13	8	29
50	Heat carried away by dry chimney gases, B.t.u.	1585	2935	1940	3851	1305	2657	922	758	2744
51	Heat lost by radiation from heater and smoke pipe, B.t.u.	304	444	424	369	428	510	519	572	539
52	Heat lost due to unconsumed gaseous combustible matter, B.t.u.	0	0	0	0	0	0	0	0	0
53	Heat lost due to unconsumed combustible in soot, B.t.u.	}								
54	Heat lost due to convection and unaccounted losses, B.t.u.	5522	2443	3147	2375	4160	3597	3370	6353	7690
55	Total heat value of fuel as fired, B.t.u. per pound	19236	19236	19236	19236	19236	19236	19236	19236	19236
	HEAT BALANCE, PER CENT HEAT IN FUEL AS FIRED—									
56	Heat imparted to tank water, (thermal efficiency) per cent	54.4	56.4	63.8	57.9	62.4	57.7	68.1	53.3	36.1
57	Heat lost due to moisture content of fuel, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	Heat lost due to water vapor formed in burning hydrogen, per cent	7.0	7.4	7.4	7.3	6.8	6.8	6.8	6.7	6.7
59	Heat lost due to moisture in air used for combustion, per cent	0.1	0.4	0.2	0.4	0.1	0.3	0.1	0.1	0.2
60	Heat carried away by dry chimney gases, per cent	8.2	20.7	10.1	20.0	6.8	13.8	4.8	3.9	14.3
61	Heat lost by radiation from heater and smoke pipe, per cent	1.6	2.3	2.2	1.9	2.2	2.6	2.7	3.0	2.8
62	Heat lost due to unconsumed gaseous combustible matter, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	Heat lost due to unconsumed combustible in soot, per cent	}								
64	Heat lost due to convection and unaccounted losses, per cent	28.7	12.8	16.3	12.5	21.7	18.8	17.5	33.0	39.9
65	Total heat value of fuel as fired, per pound	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	ELECTRIC POWER, D. C.—									
66	Volts	112.4	111.6	110.4	110.7	109.3	109.3	109.4	109.9	109.9
67	Amperes	1.7	1.7	1.8	1.8	1.4	1.3	1.2	1.1	1.1
68	Watts	191.0	190.0	199.0	199.0	153.0	142.0	131.0	121.0	121.0

INVESTIGATION OF DOMESTIC OIL BURNERS—TABLE 2: LOG OF TEST DATA

Item No.	ITEMS AND UNITS:								
1	Test number	510	511	512	513	514	526	527	535
2	Date	6-22-25	6-22-25	6-23-25	6-23-25	6-23-25	7-8-25	7-8-25	7-21-25
3	Duration of test—hours	1	1	1	.667	.667	1	1	.833
4	Heater used, number of sections	6	6	6	6	6	6	6	6
5	Fuel, kind and sample number	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3
	RATES—								
6	Fuel burned, pounds per hour	14.10	12.06	17.24	20.90	15.26	15.90	11.35	15.06
7	Fuel burned, gallons, per hour	1.958	1.675	2.395	2.903	2.120	2.208	1.576	2.092
	DRAFT—								
8	Base of flue, inches of water	0.007	+0.003	0.041	0.048	0.041	+0.014	+0.008	0.033
9	Combustion chamber, inches of water	0.015	0.008	0.037	0.036	0.040	+0.004	+0.002	0.033
10	Ash pit, inches of water	.....	.....	.....	.....	.....	.....	.....	.....
	TEMPERATURES—								
11	Cooling water outlet, T. C. No. 1	87	92	91	88	89	96	96	91
12	Cooling water inlet, T. C. No. 2	71	71	69	69	69	72	75	72
13	Tank water inlet, left, T. C. No. 3	150	160	164	158	154	162	157	158
14	Tank water inlet, right, T. C. No. 4	148	159	162	157	152	160	156	157
15	Water, top section of heater, T. C. No. 5	153	162	164	157	155	163	159	162
16	Tank water outlet, left, T. C. No. 6	111	127	129	124	125	126	128	109
17	Tank water outlet, right, T. C. No. 7	111	127	129	124	125	126	128	109
18	Water, boiler inlet, left, T. C. No. 8	111	128	130	125	126	127	129	109
19	Water, boiler inlet, right, T. C. No. 9	111	128	130	125	126	127	129	109
20	Ash pit surface, right, T. C. No. 10	173	250	216	258	273	200	265	182
21	Ash pit surface, left, T. C. No. 11	.....	134	122	170	192	107	171	96
22	Surface firepot section, right, T. C. No. 12	112	126	125	122	121	126	128	115
23	Surface firepot section, left, T. C. No. 13	114	128	128	123	124	129	130	117
24	Surface shallow intermediate section, right, T. C. No. 14	119	127	129	124	119	129	128	122
25	Surface shallow intermediate section, left, T. C. No. 15	141	151	153	150	145	152	149	149
26	Surface, top section, right, T. C. No. 16	141	151	151	147	143	152	150	150
27	Surface, top section, left, T. C. No. 17	88	93	86	88	86	153	152	150
28	Surface, deep intermediate section, right, T. C. No. 18	111	119	113	118	109	120	119	113
29	Surface, deep intermediate section, left, T. C. No. 19	136	144	145	143	140	147	144	141
30	Fuel, T. C. No. 20	76	79	71	72	71	83	86	74
31	Surface smoke pipe, T. C. No. 21	212	208	242	261	224	246	235	276
32	Flue gas, T. C. No. 22	369	359	434	468	400	404	380	444
33	Air to ash pit, T. C. No. 23	82	89	84	86	86	83	88	77
	FLUE GAS ANALYSIS—								
34	Carbon dioxide, per cent by volume	10.9	10.5	9.6	10.8	8.9	13.5	10.2	9.8
35	Oxygen per cent by volume	5.5	6.3	7.7	6.0	7.9	1.7	7.1	7.7
36	Carbon monoxide per cent by volume	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
37	Nitrogen per cent by volume (difference)	83.6	83.2	82.7	83.2	83.2	84.8	82.7	83.5
	PSYCHROMETER READINGS—								
38	Wet bulb	66	69	68	70	69	78	80	70
39	Dry bulb	76	79	71	72	71	83	86	74
	QUANTITIES—								
40	Cooling water passed through cooler, pounds per hour	6314	6152	7142	7008	6857	5483	5182	6371
	Heat in boiler and tank water:								
41	Beginning of test, B.t.u.	101796	140011	125902	120660	131488	121357	139256	103547
42	End of test, B.t.u.	159453	164715	180418	182337	166032	177841	162674	160670
43	Heat added to boiler and tank water, net B.t.u. per hour	57655	24704	54516	92516	50316	56484	23418	58548
44	Heat removed by cooling water, net B.t.u. per hour	100834	135036	156838	132872	136856	131263	108563	120790
45	Heat imparted to tank water, net B.t.u. per hour	158489	159740	211354	225387	187172	187747	131981	179337
	HEAT BALANCE PER POUND OF FUEL AS FIRED—								
46	Heat imparted to tank water, B.t.u.	11240	13245	12259	10786	12269	11803	11628	12572
47	Heat lost due to moisture content of fuel, B.t.u.	0	0	0	0	0	0	0	0
48	Heat lost due to water vapor formed in burning hydrogen, B.t.u.	1381	1372	1422	1438	1404	1392	1375	1423
49	Heat lost due to moisture in air used for combustion, B.t.u.	20	34	51	54	53	46	58	64
50	Heat carried away by dry chimney gases, B.t.u.	1361	1349	1907	1857	1858	1215	1458	1906
51	Heat lost by radiation from heater and smoke pipe, B.t.u.	315	412	320	318	409	320	518	370
52	Heat lost due to unconsumed gaseous combustible matter, B.t.u.	0	0	0	0	0	0	0	0
53	Heat lost due to unconsumed combustible in soot, B.t.u.	}							
54	Heat lost due to convection and unaccounted losses, B.t.u.	5394	3389	3762	5268	3728	4940	4684	3396
55	Total heat value of fuel as fired, B.t.u. per pound	19721	19721	19721	19721	19721	19721	19721	19721
	HEAT BALANCE, PER CENT HEAT IN FUEL AS FIRED—								
56	Heat imparted to tank water, (thermal efficiency) per cent	57.0	67.2	62.2	54.7	62.2	59.9	59.0	63.7
57	Heat lost due to moisture content of fuel, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
58	Heat lost due to water vapor formed in burning hydrogen, per cent	7.0	7.0	7.2	7.3	7.1	7.1	7.0	7.2
59	Heat lost due to moisture in air used for combustion, per cent	0.2	0.2	0.2	0.3	0.3	0.2	0.3	0.3
60	Heat carried away by dry chimney gases, per cent	6.9	6.8	9.7	9.4	9.4	6.2	7.4	9.7
61	Heat lost by radiation from heater and smoke pipe, per cent	1.6	2.1	1.6	1.6	2.1	1.6	2.6	1.9
62	Heat lost due to unconsumed gaseous combustible matter, per cent	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
63	Heat lost due to unconsumed combustible in soot, per cent	}							
64	Heat lost due to convection and unaccounted losses, per cent	27.3	16.7	19.1	26.7	18.9	25.0	23.7	17.2
65	Total heat value of fuel as fired, per pound	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	ELECTRIC POWER, A. C.—								
	Watts	271	257	253	254	288	256	268	274

FOR BURNER B—1925

380	447	448	385	386	387	388	389	390	391	392	
3-7-25	3-9-25	3-9-25	3-17-25	3-17-25	3-17-25	3-17-25	3-18-25	3-18-25	3-18-25	3-19-25	
0.83	1	1	1	1	1	1	1	1	1	1	
5	5	5	5	5	5	5	5	5	5	5	
Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	Dist. 2	
13.51	10.48	10.57	14.72	11.27	9.29	7.02	7.61	9.96	12.62	15.58	
1.900	1.473	1.485	2.069	1.584	1.306	.987	1.070	1.400	1.774	2.190	
0.069	0.001	0.071	+0.002	+0.001	+0.001	+0.001	0.007	0.040	0.060	0.106	
0.065	0.020	0.041	0.017	0.017	0.017	0.017	0.017	0.034	0.040	0.061	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	
	148	109	98	100	99	93	110	114	118	97	92
	43	42	42	49	49	49	50	50	49	49	50
158	188	176	158	186	183	168	158	163	172	174	175
158	188	176	158	186	183	168	158	163	172	174	175
161	192	182	165	192	184	175	164	170	177	182	184
145	161	148	134	161	151	140	136	140	147	145	142
145	161	148	134	161	151	140	136	140	147	145	142
145	161	148	134	163	152	142	138	142	149	147	144
145	161	148	134	153	153	142	138	142	149	147	144
74	76	84	82	87	91	89	84	78	81	83	80
72	76	83	81	86	90	87	83	77	80	83	76
129	148	139	124	143	143	134	128	132	137	137	135
130	149	140	125	145	143	133	128	132	137	137	136
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
144	168	161	147	171	168	154	146	151	158	162	164
142	168	158	145	168	165	153	145	150	157	161	161
136	161	150	136	158	154	143	136	140	146	149	149
145	174	162	145	172	169	154	146	150	157	160	161
68	72	74	74	.....	.....	.....	.....	.....	.....	.....	.....
199	249	219	260	261	250	250	227	238	265	291	294
219	279	249	286	298	287	287	265	286	434	475	510
69	73	78	78	76	77	80	78	74	77	78	79
2.7	10.6	10.0	3.5	12.5	10.4	8.1	5.7	5.5	4.5	4.8	5.1
16.9	6.4	7.2	15.9	2.5	7.0	10.2	13.3	13.6	14.7	13.8	14.0
0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
80.4	83.0	82.8	80.6	84.0	82.6	81.7	81.0	80.9	80.8	81.4	80.9
54	60	61	58	56	58	57	58	59	61	62	62
68	72	74	74	66	66	66	65	70	71	72	71
0	704	1765	1946	3152	3113	3079	1385	1498	1488	2941	3770
124561	142644	159580	145479	165570	177368	163171	147686	156199	160123	167719	154923
171688	206902	173061	145479	177927	168890	148554	146193	148838	161390	158598	163149
47027	77419	13471	0	12357	—8478	—14617	—1493	—7361	1267	—9121	8216
0	73795	118202	103995	160752	155650	135537	82947	95692	102583	141197	158113
47027	151214	131673	103995	173109	147172	120920	81454	88331	103850	132076	166329
5938	11146	12564	10312	11760	13059	13016	11603	11607	10427	10466	10676
0	0	0	0	0	0	0	0	0	0	0	0
1298	1324	1307	1326	1341	1336	1336	1326	1383	1905	1427	1448
29	16	14	37	12	17	26	29	44	69	75	78
2744	986	852	2082	865	1071	1368	1742	2848	5985	4149	4257
539	468	412	434	394	490	549	626	589	527	468	382
0	0	0	0	744	0	0	0	0	0	0	0
7690	5296	4057	4145	4120	3263	2947	3916	2765	2323	2651	2395
19236	19236	19236	19236	19236	19236	19236	19236	19236	19236	19236	19236
36.1	57.9	65.3	53.6	61.1	67.9	67.7	60.3	60.3	54.2	54.4	55.5
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6.7	6.9	6.8	6.9	7.0	6.9	6.9	6.9	7.2	9.9	7.4	7.5
0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.4	0.4	0.4
14.3	5.1	4.6	13.5	4.5	5.6	7.1	9.0	14.8	20.7	21.6	22.1
2.8	2.4	2.1	2.2	2.0	2.5	2.8	3.2	3.1	2.7	2.4	2.0
0.0	0.0	0.0	0.0	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
39.9	27.6	21.1	21.6	21.4	17.0	15.4	20.4	14.4	12.1	13.8	12.5
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
109.9	109.3	107.8	108.0	111.5	112.4	112.6	112.6	112.8	112.9	112.1	112.0
1.1	1.5	1.4	1.4	1.7	1.4	1.3	1.2	1.2	1.3	1.5	1.7
121.0	164.0	151.0	151.0	190.0	157.0	146.0	135.0	135.0	147.0	168.0	190.0

FOR BURNER D—1925

536	537	538	539	540	541	542	543	544	545	546	
7-21-25	7-21-25	7-23-25	7-23-25	7-27-25	7-27-25	7-27-25	7-31-25	7-31-25	7-31-25	8-3-25	
.833	0.750	1	1	1	1	1	1	1	1	1	
6	6	6	6	6	6	6	6	6	6	6	
Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	
15.06	15.25	18.66	15.47	14.90	15.20	15.85	10.00	12.00	13.55	15.95	18.38
2.092	2.118	2.592	2.149	2.070	2.111	2.202	1.389	1.667	1.882	2.215	2.553
0.033	+0.013	+0.003	+0.008	0.036	0.029	0.006	+0.003	0.033	0.036	0.042	0.038
0.033	0.004	0.038	+0.001	0.037	0.034	0.012	0.000	0.033	0.034	0.031	0.027
.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
91	93	94	88	89	84	93	87	81	84	90	86
72	72	74	72	72	73	73	73	73	73	73	70
158	168	171	150	153	147	168	148	133	146	162	161
157	167	170	148	151	146	166	146	132	146	161	159
162	169	172	150	155	151	170	151	138	150	168	165
109	123	126	117	121	110	134	121	104	117	130	127
109	123	126	117	121	111	136	122	105	118	133	129
109	124	127	117	122	112	137	123	106	119	132	129
182	124	127	117	122	112	138	124	107	119	135	131
96	258	287	189	242	170	280	280	147	200	261	220
115	155	186	100	158	96	168	194	89	132	171	116
117	128	126	115	120	109	133	121	103	115	128	125
123	130	132	116	121	115	135	122	105	116	129	127
149	128	127	118	121	115	130	120	106	115	123	126
150	155	157	140	146	139	157	140	129	139	154	153
150	155	158	140	146	139	156	140	128	139	152	153
113	157	152	136	142	141	157	144	131	141	166	157
141	120	118	114	112	102	120	111	98	105	115	119
74	162	153	136	139	133	162	135	121	132	145	144
273	75	75	73	76	75	76	78	70	70	74	72
444	246	276	246	273	269	276	235	302	287	330	341
77	393	451	400	448	434	427	359	431	458	520	545
	81	79	76	78	77	84	83	77	81	86	86
9.8	13.7	12.5	13.5	9.5	10.3	13.0	10.1	7.5	7.8	8.0	8.8
7.7	2.5	3.1	2.5	7.6	6.9	3.2	7.1	11.0	10.2	10.0	8.9
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
82.5	83.8	84.4	84.0	82.9	82.8	83.8	82.8	81.5	82.0	82.0	82.3
70	72	73	68	71	70	73	74	69	69	73	68
74	75	75	73	76	75	78	78	70	70	74	72
6371	6281	6179	7468	7380	7753	6416	6859	7545	7443	7195	7966
103547	128013	121212	110824	121885	100858	139874	132888	97076	116439	138575	121797
160670	174300	182478	161996	166154	158778	186032	149660	138575	156191	173208	175729
68548	46287	81688	51172	44269	57920	46158	16772	41499	38752	34633	53932
120790	131587	123265	119189	125164	85128	127999	95820	60209	81724	122027	127217
189337	177874	204953	170361	169433	143048	174157	112592	101708	120476	156660	181149
12572	11664	10980	11012	11371	9411	10988	11259	8476	8891	9822	9856
0	0	0	0	0	0	0	0	0	0	0	0
1423	1395	1426	1401	1423	1417	1410	1374	1421	1436	1464	1480
54	37	50	32	58	49	43	46	69	71	82	76
1906	1188	1530	1238	1974	1763	1370	1406	2411	2492	2797	2704
370	425	417	322	439	336	472	538	471	469	547	448
0	0	0	0	0	0	0	0	0	0	0	0
2396	5012	5318	5716	4456	6745	5438	4998	6873	6362	4999	5163
19721	19721	19721	19721	19721	19721	19721	19721	19721	19721	19721	19721
63.7	59.1	55.7	55.8	57.6	47.7	55.7	57.1	43.0	45.1	49.8	50.0
0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
7.2	7.1	7.2	7.1	7.2	7.2	7.1	7.0	7.2	7.3	7.4	7.5
0.3	0.2	0.3	0.2	0.3	0.2	0.2	0.2	0.3	0.4	0.5	0.4
9.7	8.2	8.3	8.2	8.3	8.2	8.2	8.2	8.3	8.4	8.5	8.4
1.9	6.0	7.8	6.3	10.0	8.9	6.9	7.1	12.2	12.6	14.2	13.7
0.0	2.2	2.1	1.6	2.2	1.7	2.4	3.2	2.4	2.4	2.8	2.3
	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
17.2	25.4	26.9	29.0	22.7	34.0	27.7	25.4	34.9	32.2	25.3	26.1
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
274	288	276	232	245	271	252	247	.....	217	223	213

water within desired limits for a period of one hour.

The burner was always operated for a considerable length of time preceding each test, thus insuring steady conditions before readings were begun.

When operating so as to realize a certain carbon dioxide content in the flue gas, the burner was adjusted for this condition before readings were begun. Thus if a CO_2 content of 10 per cent was desired at a given rate, the procedure was as follows: First, the desired fuel rate was achieved by adjusting the fuel admission needle valve; this was done by "cut and try" methods. Second, the desired CO_2 content was secured by regulating the excess air, the Orsat determinations being made until the desired 10 per cent of CO_2 was reached. Then conditions were ready to start a run.

In some series the draft intensity at base of flue was maintained constant at a definite value. This was accomplished by manipulation of the stack damper, after the desired fuel rate had been secured.

The readings of the graduated fuel tank, draft gages, temperatures, electrical input, etc., were made every 10 minutes, and the flue gas samples were drawn three times during each run. The cooling water was run into each of two calibrated tanks alternately, and the total quantity thus determined. The quantity of water in the circulation system was determined after each run.

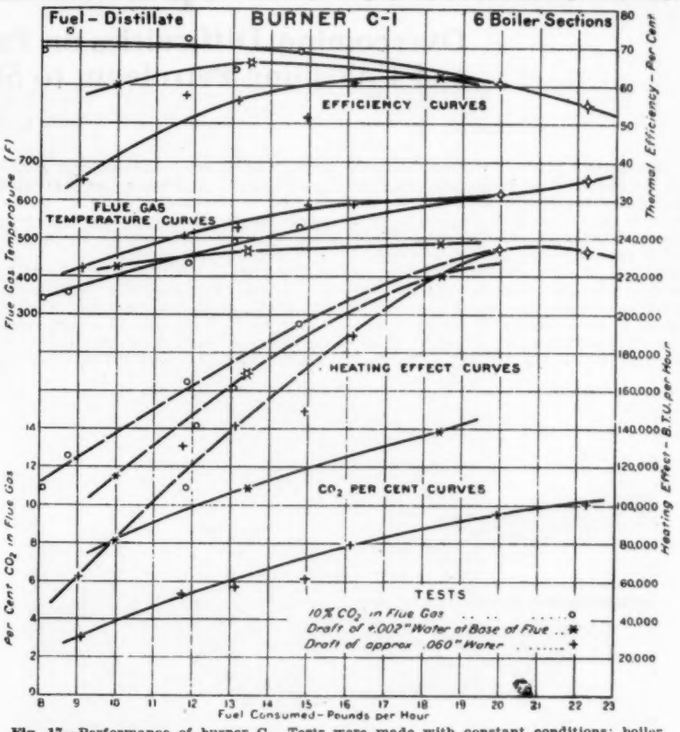

Fuel – Distillate
BURNER C-1
6 Boiler Sections
EFFICIENCY CURVES
FLUE GAS TEMPERATURE CURVES
HEATING EFFECT CURVES
CO2 PER CENT CURVES
TESTS
10% CO2 in Flue Gas
Draft of +.002" Water at Base of Flue
Draft of approx .060" Water
Flue Gas Temperature (F)
Per Cent CO2 in Flue Gas
Thermal Efficiency - Per Cent
Heating Effect - B.T.U. per Hour
Fuel Consumed - Pounds per Hour

Fig. 17—Performance of burner C. Tests were made with constant conditions; boiler of six sections; fuel, distillate. Runs Nos. 449, 450, 393-406.

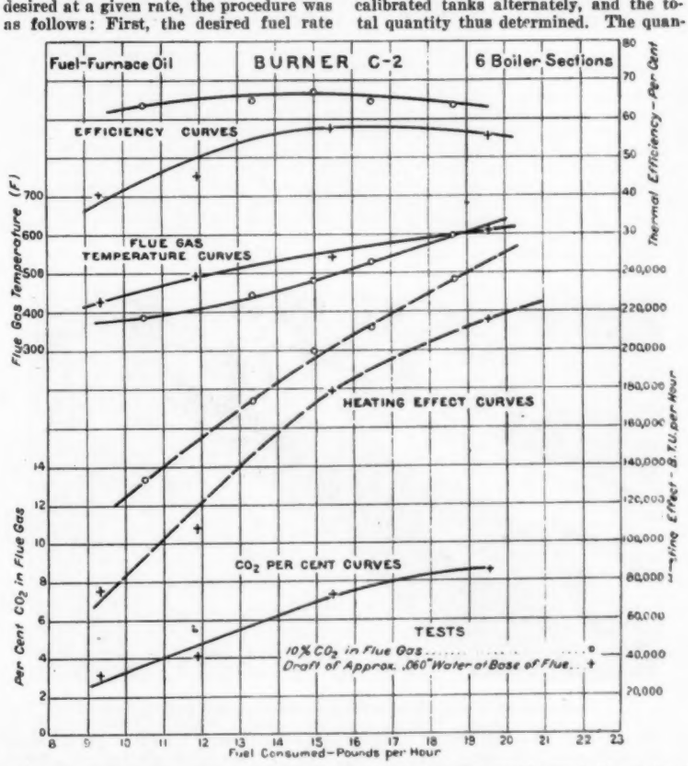

Fuel-Furnace Oil
BURNER C-2
6 Boiler Sections
EFFICIENCY CURVES
FLUE GAS TEMPERATURE CURVES
HEATING EFFECT CURVES
CO2 PER CENT CURVES
TESTS
10% CO2 in Flue Gas
Draft of Approx. .060" Water at Base of Flue
Flue Gas Temperature (F)
Per Cent CO2 in Flue Gas
Thermal Efficiency - Per Cent
Heating Effect - B.T.U. per Hour
Fuel Consumed - Pounds per Hour

Fig. 18—Performance of burner C. Tests made with constant conditions; boiler of six sections; fuel, furnace oil. Runs Nos. 423-427, 440, 441, 451, 452.

Fuels Used

The term fuel oil as applied to petroleum products used for heat and power purposes is very indefinite. The product, as found on the market, ranges from the light distillate series of 38-40

(Continued on Page 148)

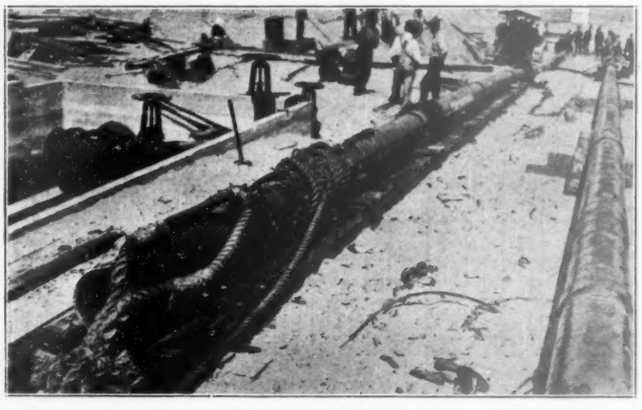
Submarine Pipe Lines at Outside Ports

Overcoming Difficulties on Pacific in Loading Oil on Tankers and Unloading Petroleum to Shore Where There Is No Harbor

By L. P. Stockman

The growth of the petroleum industry on the Pacific Coast has resulted in some interesting engineering problems, not the least of which has been the development and utilization of outside ports, which, while advantageously located, geographically, afford very little protection to tankers from the elements. To the seafarer or mariner an outside port is one which is not favored with a natural barrier or breakwater, as is usually found in large commercial harbors. The lack of wharfage facilities in these instances and many times insufficient depth of water requires the installation of either floating lines or submarine pipe lines. In the former case the line is floated on the surface of the water while in the latter it is entirely submerged and securely anchored, connections in each case being made by using rubber hose. In open harbors barging is sometimes resorted to but the most economical method is the submarine pipe line.

Just before the first length of the Associated Oil Co.'s new submarine line at Monterey was pulled out to sea. It was held firmly in place by several tons of chains.



First length of 12-inch submarine line ready to be towed to sea.

The Union Oil Co. of California was the first concern to use insulated submarine lines, adopting this improvement early in 1922. The floating line at outside ports, of course, antedates the submarine line by many years and, peculiarly, the Union is also credited with pioneering this method. The first delivery of California fuel oil to Chile was made by the Union in 1907, discharge at the open port of Taltal being made through a submarine line. A floating line was used in 1902 in discharging cargo at service points in the Hawaiian Islands, where the Union also pioneered the distribution of California oil.

The principal outside ports in California today, Port San Luis, Ventura and Monterey, are all being used to some extent by various pipe line companies. In the early days, Port San Luis and Ventura had the distinction of being the leading oil exporting ports in California, due principally to their proximity to the Santa Maria and Ventura County Fields. That the Union was the first company to use an outside port in California is evidenced by the quantity of oil moved out of these points in the early days. It has not been necessary of late to increase facilities at Port San Luis but considerable improvements have been made and expansion work undertaken at Monterey and Ventura, due to increased production in the Ventura Avenue Field and general growth at other points.

The Associated Oil Co., during the past year, completed submarine pipe lines at Ventura and Monterey, both open ports, in order to facilitate the movement of crude oil to its refineries. Before the completion of the new lines at Ventura it was the policy to load small tankers at an old wharf but the depth of the water, only 25 feet at high tide, precluded the use of large ships. Then for some time the company brought in large tankers and anchored them about 800 feet off the end of the old wharf, an 8-inch rubber hose being run out to the tanker each time. The stringing of this hose every time a tanker came in always caused considerable loss of time and, as a whole, this practice was slow and unsatisfactory. Then, too, the company's Ventura Avenue production grew to such an extent that it became imperative to augment the loading facilities available. It was, therefore, decided to lay a submarine line out into the ocean about half a mile from shore where the desired depth of water was to be found.

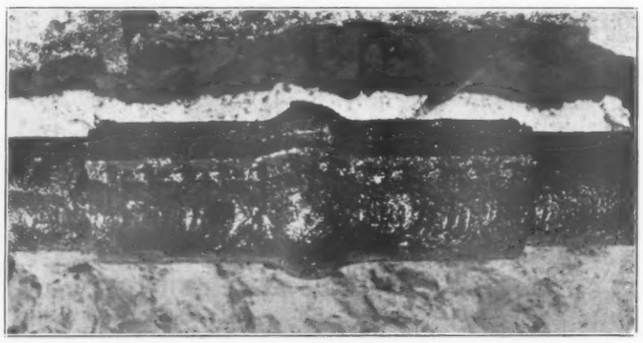
Laying Submarine Line

A total of 3,200 feet of 10-inch 45-pound Youngstown casing was screwed together and welded at the collars in four 800-foot lengths and laid parallel on the beach, pointing seaward. These sections were then tested under 500 pounds pressure and later painted with oronite and coated with Biturine enamel. The next move was to build a track of 6 by 6 pine timbers and several small sleds to run on these timbers. After completion the first 800-foot length of pipe was then rolled over upon these sleds and made ready. The sea end was plugged and a sand sled attached to the head of the line with a buoy attached so that the position of the end of the line could be determined at all times.

On September 4, of last year, the first 800 feet was towed to sea, the job only requiring five minutes. The land end was unavoidably pulled into the surf but a tractor dragged it back with but little trouble. The second 800 feet of pipe was then welded and a river clamp bolted on to strengthen the joint. This time the land end was stopped about five feet before it reached the end of the next 800 feet to be welded. An oxy-acetylene torch soon cut off the overlap and this new joint was made as previously. Each 800 feet of pipe used, of course, added to the weight and friction and, while some difficulty was experienced in pulling out the last length, it was accomplished satisfactorily. When the final signal was given to the tug to drop anchor the sea end had been pulled out 2,850 feet from shore and rested in 35 feet of water. A diver then removed the plug and, after attaching a flexible armored hose a little over 100 feet in length, made it fast to a buoy. Several tons of chain were used as a weight in order to keep the line in place.

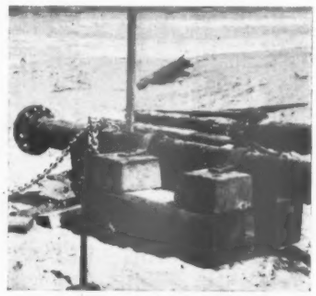
Successful Loading

A short time after completion 64,000 bbls. of crude were loaded for Avon without a mishap of any kind. This was the first tanker of crude loaded out of California using a submarine line exclusively. Loadings are now more frequent, hardly a week passing without one or more tankers lifting loads at this point. The Associated has just recently finished laying two more submarine lines on the Pacific Coast, both at Monterey. One, a 12-inch, is used for crude and fuel oil, while the other, an 8¼-inch, is used for refined oil. Due to the fact that the land end is quite high in elevation, approximately 3,000 bbls. per hour can be gravitated from tanks to ship. The construction and operation of these two lines, which are similar to the Ventura line laid previously, give the Associated an outlet at Monterey for its San Joaquin Valley oil and conversely a receiving point for refined oils from its various refineries.



Flange used on Associated Oil Co.'s Ventura submarine line to relieve strain on welded joints.

In addition to enlarging its pipe line terminal at Monterey, the company increased the size of its plant and number of tanks, some of which were destroyed by fire several months ago when lightning hit a tank of crude. Present storage capacity approximates 480,000 bbls. available for crude and fuel oil and 37,000 bbls. for refined oil. The new loading rack on a spur track of the Southern Pacific Railroad will accommodate 18 cars, each of which can be loaded by gravity in about 10 minutes. Gasoline and refined oils will be distributed from this point to substations in the Salinas Valley and adjacent territory.



The sled on which the submarine line rode as it was towed into Monterey Bay.

The Associated and Union are not the only California companies by any means to utilize outside ports or points where there is insufficient depth of water to permit docking of tankers. The Stand-

(Continued on Page 190)

Aeroplane view of Refinery of the Shell Company of California at Martinez, California, taken from an altitude of 6000 feet

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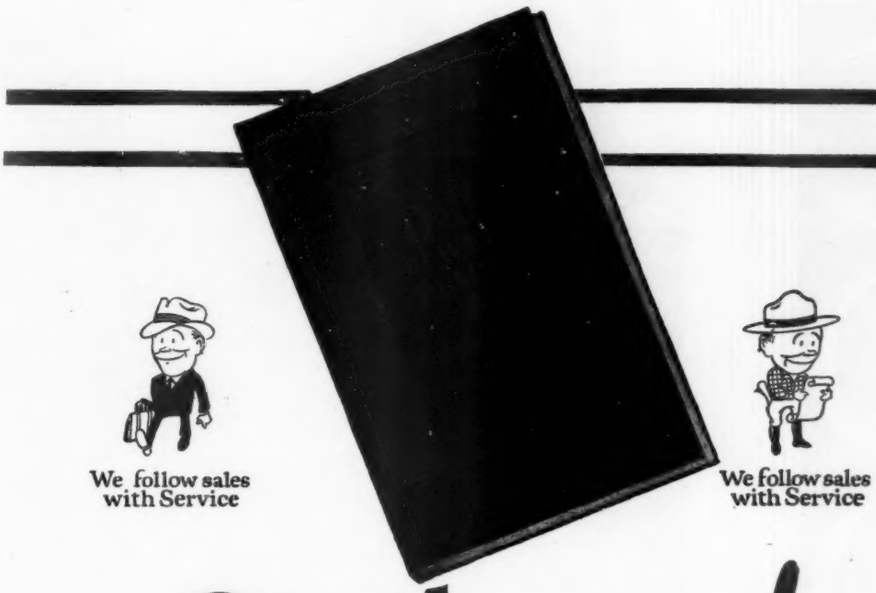
Winter scene in California ~picking sweet peas



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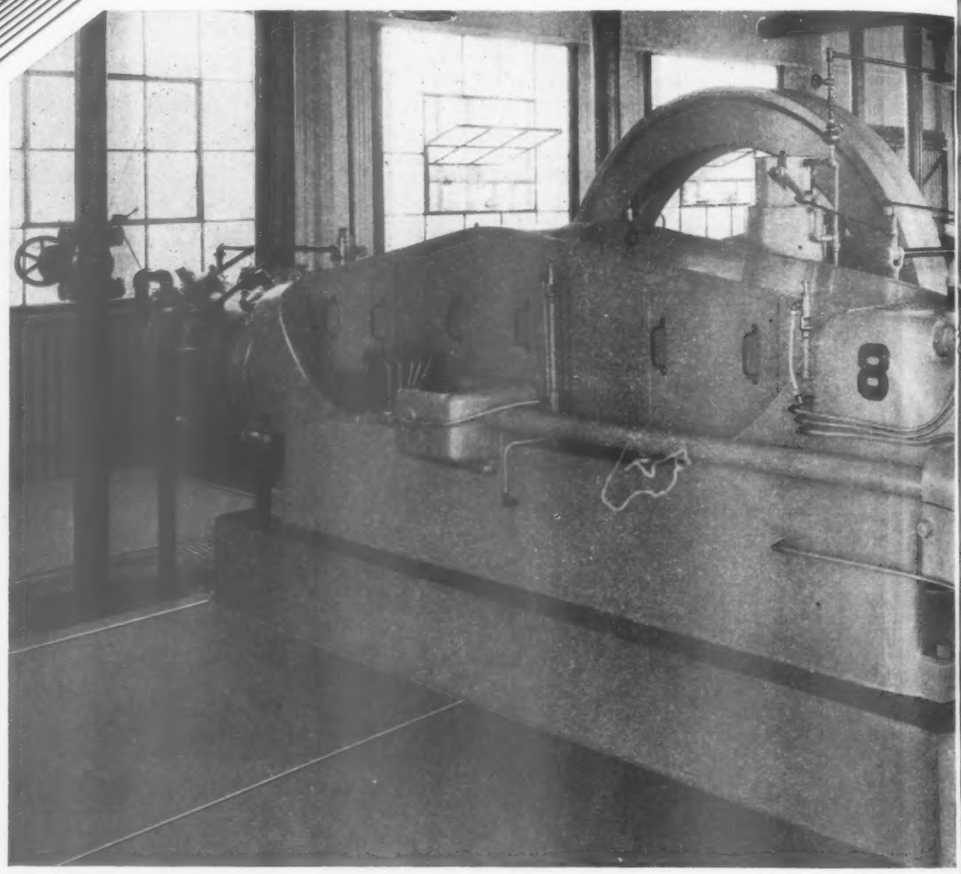

The Sinclair Oil & Gas Company's gasoline twins and two single Type 80 Cooper Engin have since bought two additional

Sinclair Oil Chooses "Coopers" for Ga

After two years of thorough investigation and observation of Cooper gas engine operation, H. B. Bernard, Vice President and Superintendent of the Gasoline Department of The Sinclair Oil & Gas Company, chose Cooper engines for their new gasoline plant in the Cromwell Pool.

The photograph shows the nine Cooper twin type 80 engines direct driving Cooper compressors; also, at the far end, two Cooper single type 80 engines with belt pulleys driving a line shaft for auxiliary power. One of these

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lant at Cromwell, Oklahoma, contains nine s, direct driving Cooper Compressors. They wins for air-lift oil-pumping service.

ENGINES

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auxiliary units is equipped with a direct connected compressor and can be used to pump gas when not required for auxiliary power.

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Some California scenes

Torrey Pines Ridge, scenic spot along the road from Los Angeles to San Diego

Snow at Arrowhead Lake, 120 miles from Los Angeles

Oranges a mile below

Bathing party at the Ambassador Hotel plunge, Los Angeles

Lincoln Park, Los Angeles

A street of homes in Los Angeles

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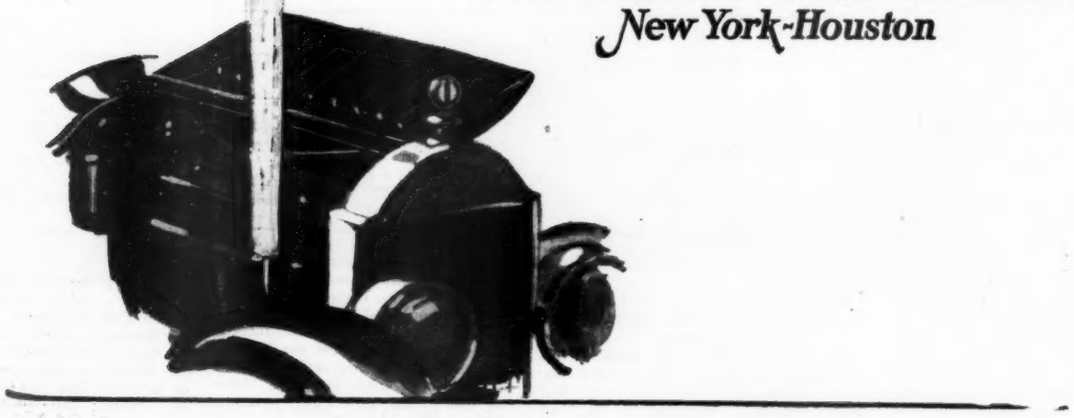


Baldwin Hills and Inglewood Field

Exploitation Began 20 Years Ago but Rapid Development During the Past Year Resulted in Peak of 116,098 Barrels

By Glenn D. Robertson and Joseph Jensen
Geologists, Pacific and Associated Oil Companies

This paper should not be considered an assemblage of original thoughts, for they have come from so many people that it is almost impossible to extend credit individually. Hence, if the ideas of someone else are voiced herein, he may claim them for his own, if he can still recognize them.

The Inglewood oil field occurs in what are generally known as the Baldwin Hills. It lies about 2½ miles northwest of the city of Inglewood. Part of the field is within the limits of Culver City. The field occupies parts of Sections 7, 8, 17 and 18 of Township 2 South, Range 14 West. The Baldwin Hills lie in the general line of uplifting that extends from Beverly Hills to Newport and contains the Rosecrans, Dominguez, Signal Hills and Huntington Beach fields.

The Beverly Hills and Baldwin Hills fields produce heavy oil, varying in gravity from 14 degrees to 22 degrees, while the other fields produce oil varying in gravity from 15 degrees to 42 degrees. The first two named fields are the only comparatively shallow fields, for their oil has been developed chiefly above 3,000 feet. On the other hand, the greatest production from the other fields has been secured below 3,000 feet.

The Baldwin Hills have long been considered as a possible source of oil. Land was leased there more than 20 years ago, a particularly attractive and suggestive feature being two gas wells located at the northwest end of the hills. The ease with which the field has been developed this year indicates that had the earlier prospectors hunted in the right place they would have had no difficulty in exploiting the field in the early days of California's oil development.

Deep Well In 1917

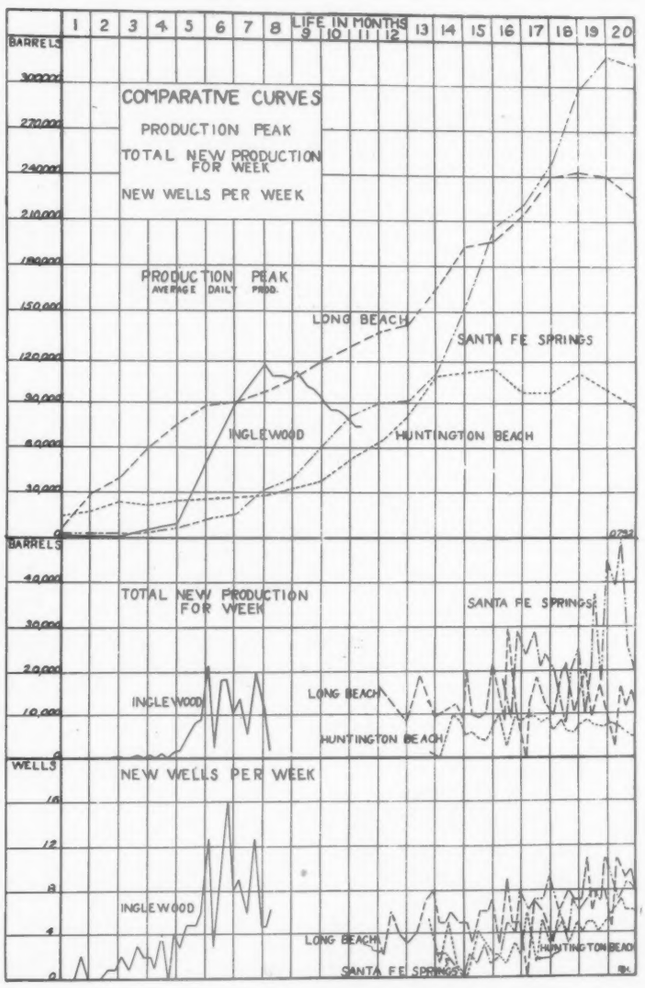
The first deep well was drilled to a depth of 4,500 feet by the Bartola Oil Co. in 1917 in the northeast quarter of the northwest quarter of Section 21. The Standard Oil Co. drilled its Nos. 1 and 2 Cienega on the Baldwin property to depths of 5,010 feet and 5,172 feet, respectively, in Sections 8 and 9. One showing of oil at 1,530 feet was reported in No. 1 Cienega. A recent test hole, drilled alongside of No. 1 Cienega to a depth of 1,781 feet, using continuous coring, failed to find any evidence of this oil showing. The Standard wells were drilled between 1918 and 1920.

In 1922 the "57" Petroleum Corp. began drilling its No. 1 Casserini well. This well was located near the old shallow gas wells above referred to. The "57" Petroleum Corp. drilled one gas well that furnished an excellent blowout. No. 1 Casserini was subsequently carried to a depth of 4,836 feet, the last 1,000 feet of hole being drilled by the Associated Oil Co. during the summer of 1924.

Beginning in 1923, the Pacific Oil Co. drilled its No. 1 Baldwin well to 6,757 feet and its No. 2 Baldwin to 4,076 feet, in Sections 5 and 9. A single oil showing in No. 1 Baldwin at 3,896 feet was all the encouragement that was secured.

Credit for the discovery of oil in the field belongs to the Standard Oil Co. as a result of finding oil in its No. 1 Los Angeles Investment Lease No. 1. This well began drilling on March 3, 1924, and had found evidence of oil within the next 10 days. It was finally completed as a commercial producer on September 28, 1924. Meanwhile the Bush well, known as the Mohawk well, began drilling. Tar sands were found at a depth of 1,500 feet early in the spring, but it was not until the last day of the year that this well was completed at a depth of 2,304 feet as a 250-bbl. well.

The next four months saw the completion of 23 wells furnishing a daily production of 5,420 bbls. of oil, or only 236 bbls. per well. Within three months 97 additional wells were completed, giving the field a peak production of 116,098 bbls. per day from 120 wells, or an average production of 967 bbls. per well. On November 10, the field had 155 producing wells, making 74,359 bbls. of oil or an average production of 480 bbls. per well. Drilling activity has dropped to a minimum, owing to the fact that the areas in which competitive drilling was necessary have now been completely drilled. The areas still undrilled are now being developed in a less intense manner.



The oil produced in the field all comes from the upper Pliocene formation.

Topography

The Baldwin Hills are more or less rectangular in shape. The greatest elevation is 513 feet above sea level. The hills have bold escarpments on their northern and western sides. These escarpments were at one time regarded as conclusive evidence of faulting, particularly along the northern side of the hills. At the present time, it has been conclusively proven by core drilling that there is no fault on the northern side of the hills. The northern escarpment is recognized as the remnant of a stream channel which joined the Los Angeles River. The western escarpment is regarded as the scarp of an old estuary that extended easterly from the ocean to Culver City.

The eastern side of the hills slopes off gradually to the Los Angeles plains, the southwest portion slopes gently to Centinela Creek, while the southeast portion joins the general line of uplifting that extends southeasterly from Beverly Hills to Newport. The hills are cut diagonally from northwest to southeast by two erosion channels that drained northerly and southerly. These channels make so wide a cut that they suggest the existence of a water course of considerable magnitude. The eastern section of the hills is larger and about 96 feet higher than the western part. Undoubtedly the cause of the bisecting of the hills is not wholly due to stream action, but to the presence of a fault having a throw of 350 feet to 400 feet. The western side of the fault was dropped.

Stratigraphy

Six different formations appear in and adjacent to the hills. The two youngest of these are the Recent Black Soils and Recent Red Soils. The next older are the sands, clay and gravels belonging to the Quaternary Pleistocene. The Quaternary Pleistocene is divided into two parts, the upper one consisting of hard red sandstone, hereinafter called "Rimrock sandstone." The upper Pliocene, or Fernando, is found on the surface east of the fault rather extensively. It only occurs west of the fault on the California Petroleum-Smith lease, where it was exposed during the summer of 1924 by hydraulic development of a sand and gravel pit. North of the hills, upper Pliocene has been exposed in sewer trenches dug by the city of Los Angeles in constructing its outfall sewer. Beds of undoubted lower Pliocene age have been identified from core samples secured in drilling. The dividing line between the Quaternary Pleistocene and upper Pliocene cannot be drawn in the field, but sufficient evidence has been secured to establish the fact that the two formations are present.

Recent Black Soil

This soil covers the flat north and west of the hills. It is fine sandy loam, high in organic matter. In some places it almost merges into peat deposits. Interbedded with it are fine alluvial sands. This soil varies in thickness from 2 feet to more than 30 feet. In some places it lies directly upon the Pleistocene gravels and sands; in other places upon the massive Pliocene shales. It may represent soil formed in a lake that lay north of the hills.

Recent Red Soil

This soil covers the southern and eastern borders of the hills. It is a mixture of coarse and fine sand, gravel and clays, representing a residual soil due to weathering in place of the Pleistocene sediments below. Its red color is probably due chiefly to the oxides of iron, but pink and red feldpars are present. Where the soil is reddest it is quite free from organic matter and packs very hard.

Quaternary Pleistocene (San Pedro Formation)

This formation occupies the entire western and southeastern parts of the hills and forms a capping on the ridges in the northeast part of the hills. It varies lithologically from place to place, both horizontally and vertically. It is thickest on the western, southern and eastern borders of the hills. In the north central part of the hills, east of the fault, it occurs as a thin capping on top of the highest ridges. In this locality the basal bed of hard, rusty conglomerate is well exposed in many places. It is separated from sands and sandy shales below by an erosional unconformity. An excellent section of the upper part of the Pleistocene is exposed on the west side of the hills near the center of the Vickers property and adjacent to the producing oil field. At this place about 250 feet of sediments are exposed. The uppermost bed is a hard red sandstone, about 12 feet thick, which we have called "Rimrock sandstone." In this part of the field it forms a small butte or table land. Its characteristic color is red or reddish pink, mottled with gray. The hardness of the Rimrock standstone seems to be due to lime in the upper layers thereof. Lower down it becomes coarser and not so well sorted. The Rimrock sandstone is particularly well developed in the southern half of the hills. While this bed can readily be traced and followed, it has not successfully served as a key to solving the underground structure because of the unconformity between the Pleistocene and Pliocene. It does, however, furnish evidence of faulting. A partial section of the Pleistocene or San Pedro

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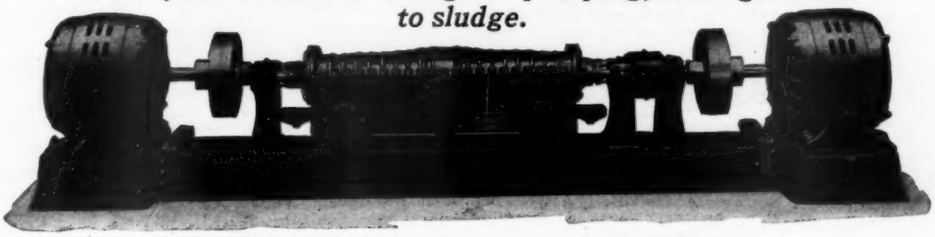

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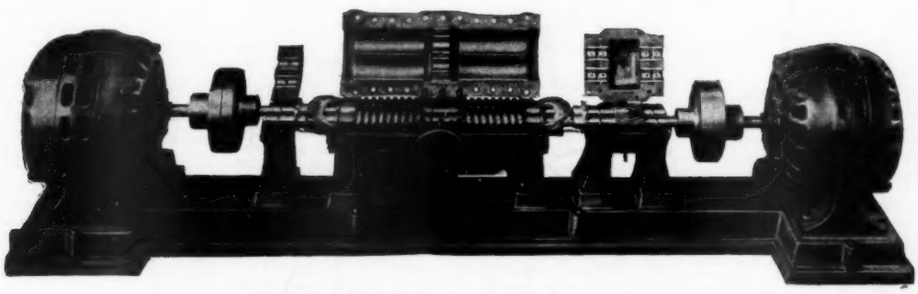

Showing accessibility with cover plate raised but not entirely removed.

Write for complete information in detail.

American Silent Chain & Pump Company

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formation exposed on the surface is as follows:

12 feet "Rimrock sandstone."

50 feet coarse and fine brown sands with some gray clay and earthy streaks.

25 feet, coarse brown sandy shale with some finer streaks. Color is gray where not badly weathered.

20 feet, dark gray and rusty organic clay shale. Contains much vegetable matter.

30 feet, loose coarse gray sands high in white feldspars.

80 feet, brown and gray sands and gravels.

Thickness of Pleistocene

The maximum thickness of the Pleistocene in the hills is not known, for the rotary drilled wells of the oil field have furnished poor and unsatisfactory logs. Probably 400 feet would represent a fair estimate of the maximum thickness developed in the hills.

In several places these Pleistocene sands and gravels are being removed from the pits for use on roads and for building purposes. Most of these excavations are in the formation west of the fault. One pit on the California-Petroleum-Smith lease occurs at an elevation of about 300 feet. It has been made by hydraulicing. Two phases of the Pleistocene sands are shown. The oldest rests with marked angular unconformity upon the upper Fernando shales. These sands are brown, yellow and white in color, very loose, and quite uniform in texture. They are distinctly cross bedded. Above them lies an irregular deposit of brown sands that are not so well washed and are more massive. Neither of these deposits seems to contain any fossils.

An old gravel pit just over a low saddle to the south gives an excellent exposure of a coarser phase of the Pleistocene. In this pit there is much more gravel than sand. Limonite has stained it a rusty brown color. A 4-foot bed of sandy clay contains marine mollusca of Pleistocene age. To the east, less than 2,000 feet, another clay bed is exposed in the gravel pit on the Moynier property, where marine fossils of the same fauna as those in the pit on the west side of the hills were found. The Moynier water well drilled nearby went out of gravel at 80 feet and was in massive gray Fernando shale at 125 feet, which was the bottom of the hole.

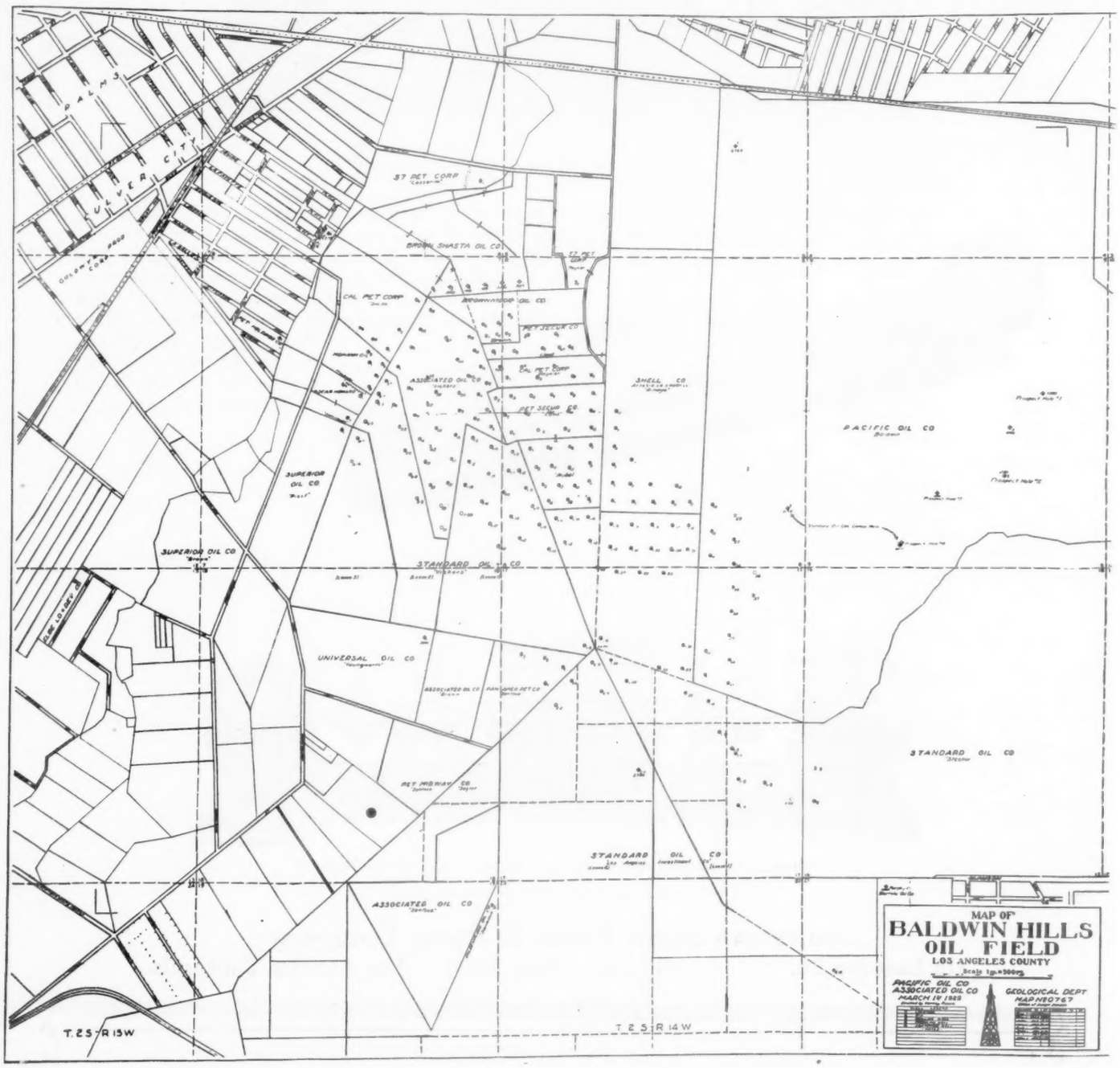
At the base of the sands and gravels of the Pleistocene is a basal conglomerate, which is the lowest member that can be definitely traced and mapped. Its age is definitely Pleistocene, for a good collection of distinctive lower San Pedro Pleistocene fossils were found in rocks that are stratigraphically below it. These rocks consisted series of 50 to 150 feet of brown, yellow and gray sands and sandy shales. The contact between these later beds and the conglomerate above is very definite and easily traceable, but the contact between this series and the Fernando below cannot be identified. These brown, yellow and gray sands and sandy shales represent the lowest beds containing Pleistocene fossils.

Pleistocene deposits also occur on the flat north of the hills around the Pacific Oil Co.'s No. 1 Baldwin well. Here it is exposed as a thin layer in the sewer trench and is covered by the Recent Black Soil. Numerous Pleistocene fossils were collected, making certain the identity of the beds.

This formation is only exposed at a point west of the fault; namely, in and near the hydraulic gravel pit. A narrow strip of formation lies adjacent to and on the east side of the fault. This formation also occupies the bottom of all of the northerly draining gulches on the Baldwin property on the north side of the hills. It is also exposed in the sewer trenches in the flat north of the hills. Throughout the hills it underlies all of the Pleistocene beds above referred to. Definite Pliocene mollusca and foraminifera were found in the beds east of the fault at an elevation of about 400 feet on the north front of the Baldwin Hills. Collections of upper Pliocene fossils were made at 10 different points east of the fault.

In general, these upper Fernando shales are very massive with bedding very indefinite in most places. Frequent bedding occurs in the formation, as shown by core test holes, at about 1,000 feet below the surface. Where bedding is found at the surface, it appears to be mostly due to a slight change in the size of the grains that make up the beds.

Perhaps the most significant occurrence of upper Fernando, or upper Pliocene, is



COURT ORDERS Home Oil Refining Co. of Texas SOLD!

LOCATION—Immediately Joining Fort Worth on the South

BIDS TO BE RECEIVED ANY TIME BEFORE JAN. 21, 1926.

List of Properties

165.6 acres, more or less, out of the E. Sutherland 320-acre survey patented to Lawrence Steele, assignee, by patent No. 352, Vol. 33; said 165.6-acre tract, more or less.

The buildings and structures situated upon the hereinbefore described tract of land; said buildings and structures consisting of the following: One brick building known as the general office building, one brick building known as laboratory, one brick and steel building known as brick warehouse, two wooden warehouses, one steel and brick boiler house, one steel and brick pump house, one steel and brick building used as a machine shop, one brick electrical building used as generator house, three brick buildings used as still houses, two brick buildings used as receiving houses, 16 frame cottages, and such other and further structures and buildings situated on said land not hereinbefore particularly described.

All personal property situated upon the hereinbefore described tract of land, or located in some one or other of the buildings and structures. Office furniture and fixtures, office supplies and material and all other character of equipment, material, supplies and personal property situated in the brick buildings, respectively, designated as a general office building and the laboratory; all material, supplies and personal property of every nature and description situated and contained in the brick and two wooden warehouses mentioned; all boilers, heaters, pumps, pipe, material, machinery supplies and personal property of every description situated and contained in the brick and steel boiler and pump houses, respectively, mentioned hereinbefore; all machinery, tools, equipment, material, supplies and all other character of personal property, including two trucks, situated and contained in the brick and steel building referred to as machine shop; all electrical apparatus, machinery, appliances, generators, motors, wiring, fittings and every other character of personal property situated in the brick building known as the electrical substation or buildings hereinbefore mentioned; all pumps, material, machinery, supplies, and all other character of personal property situated in the brick buildings referred to as still houses, including the condenser boxes on the top of said building and the said stills placed on foundation in connection therewith; all lookout boxes, pipe, valves and fittings, and all other character of personal property contained in either one or both of the two brick buildings referred to as receiving houses, four 55,000-barrel all-steel storage tanks, one 37,500-barrel all-steel storage tank, four 10,000-barrel each all-steel storage tanks, one 8,000-barrel all-steel storage tank, two 7,000-barrel all-steel storage tanks, two 6,000-barrel all-steel storage tanks, one 5,000-barrel all-steel storage tank, sixteen 12,000-barrel all-steel storage rundown tanks, two 1,000-barrel all-steel storage tanks, one 1,000-barrel all-steel storage tank, and all other tanks of every description situated upon the land hereinbefore described; one 1,000-barrel agitator or tank; all pipe connections, fittings, valves, control heads, and all other character of personal property of every nature and description, constituting the gathering and distribution system situated along, over and under the land, hereinbefore described, including all pipe, fittings, valves and material of every nature and description, located in the spray pond on said land, together with all pipe, material and personal property of every nature and description, composing the loading rack upon said land, together with the side track and switch, approximately 4,000 feet more or less, in length upon said land, together with all casings, pipe, material and all character of other things used in connection with the two water wells upon said land, together with all pipe, connections, fittings, valves and all other character of material forming and constituting a pipe line extending from the tract of land hereinbefore described to the pipe line of Magnolia Petroleum Company near the city of North Fort Worth, Tarrant County, Texas, together with all the right of way and franchise therefor, to the extent that either or both are now in force and effect, all said personal property hereinbefore mentioned together with the buildings and structures hereinbefore referred to, being approximately described in the inventory prepared by the said receivers.

TERMS AND CONDITIONS OF SALE

B. K. Goree, receiver of the Home Oil & Refining Co. of Texas, will receive sealed bids, when delivered to him at any time on or before the 21st day of January, 1926, which said sealed bids he will deliver to the Hon. R. E. L. Roy, Judge of the 17th Judicial District Court of Tarrant County, Texas, on January 23rd, 1926, at 9 o'clock a. m., at which time and place the Court will open said bids so received; and the Court, at such time and place, and at any and all adjournments thereof, without further notice to creditors, or parties at interest, will consider, pass upon, and accept or reject, any or all of said bids so submitted.

All bids submitted to the receiver must be in writing and must be accompanied by either a Cashier's Check or a Certified Check for 25 per cent of the total amount of the bids submitted on personal property alone and 15 per cent otherwise, with the understanding and agreement, on the part of the bidder, evidenced by the submission of said bid, that in the event and should the said bid be accepted, the receiver thereupon shall immediately be entitled to cash the said check so deposited with the said bid, placing same to the receiver's credit and hold the money subject to the order of the Court, pending delivery of conveyance for bill of sale, as directed by order of the Court.

No bids will be considered for the whole of said land, buildings, structures and all personal property for a sum less than $175,000.

After the opening of the bids in open Court on the 23rd of January, 1926, no bidder shall be allowed thereafter to increase or better any bid so submitted.

The receiver will pay all taxes up to and including the year 1925.

BIDS MAY BE SUBMITTED FOR ANY ONE OR MORE OF THE FOLLOWING:

Option No. 1 For the whole of the properties herein authorized to be sold by the receiver (and excepting only that personal property reserved from sale, as herein mentioned).

Option No. 2 Bids may be submitted for the whole of said land, together with the buildings and structures, including the fencing (but not including any of the personal property either stored in or erected in any of the said buildings or structures, or attached either to the floors, ceilings or walls thereof).

Option No. 3. Bids may be submitted for all the personal property (excepting only and not including the land hereinbefore described, together with the building, structures and fencing thereon situated, as defined in the option immediately preceding).

Option No. 4. Bids may be submitted for any one or more of the respective tracts hereinafter designated together with such buildings, structures and fencing as are situated upon the said respective tracts designated to-wit: First tract 145.15 acres. Second tract 20.45 acres (with buildings).

Option No. 5. Bids may be submitted for any of the following named and designated parcels of personal property, as that termed has been hereinbefore used, to-wit:

Group 1. All office furniture, office fixtures, office supplies and material, including all kitchen utensils and equipment, (not including, but expressly excluding, the blue print machine and its accessories, and such other articles marked reserved in the receiver's inventory, on file herein).

Group 2. For the blue print machine and its accessories located in the general office building.

Group 3. All laboratory machinery, equipment and material located in the laboratory building, as well as in the general office building.

Group 4. All steel and wooden storage tanks erected or located upon the land (not including any material composing a component part of a storage tank which is located in any of the buildings and structures as those terms have hereinbefore been defined).

Group 5. All pipe and casing of every size and description running over, across, in and under the land hereinbefore described, meaning the entire tract, (excluding, however, such pipe constructed to be used for sewerage and water supply purposes, which exclusion includes pipe in both water wells), and including all pipe and casing in each and all of the buildings and structures hereinbefore named and designated, whether stored therein or constituting pipe leading to and from machinery and appliances.

Group 6. All pumps, including electrical, centrifugal pumps in pump house, and all other character makes, and dimensions of pump wherever located, upon the entire tract of land hereinbefore mentioned and described whether in the buildings or structures hereinbefore designated, or in the warehouses, (and excluding only that certain electrical pump on the well site and erected to be used for the operation of the water well).

Group 7. For the two water wells, all pipe therein contained and the equipment situated at one of the well sites, together with all equipment and material now forming a part and portion of each of said water wells.

Group 8. The four 250 H. P. Murray boilers situated in the boiler house.

Group 9. All belting, shafting, motors, lathes, drills and drill bits, pipe machinery, bench vises, switches, bolt machines, telley shaper, air valves and grinding machine and McCoy and Brandt steam engine, all situated in the machine shop building; (the foregoing not including any and all other miscellaneous equipment material, supplies and personal property stored or located therein).

Group 10. All of the miscellaneous material, equipment and personal property stored or located in the machine shop building (excluding only those particular machines and articles included in the preceding group and two trucks included in group 17).

Group 11. All material of every nature and character (other than expressly excepted in the preceding respective groups and in group 14, as well as one truck included in group 17), stored or located in the brick warehouse and the wooden warehouses.

Group 12. For all stills, condenser boxes, lookout boxes and all pipe used in condenser boxes.

Group 13. For all electrical machinery and equipment and material located in the electrical sub-station building.

Group 14. For two round horizontal tanks, capacity 2,100 gallons, and one round horizontal tank, capacity 1,680 gallons, stored in the wooden warehouse.

Group 15. For the loading rack including the pipe, funnels (but excluding all other pipe used in connection therewith, which said pipe so excluded constitutes a portion of group No. 5 hereinbefore mentioned).

Group 16. The side track and such switch as is located upon the land hereinbefore described.

Group 17. For three trucks and all other miscellaneous equipment not hereinbefore expressly named or designated in any other group.

Group 18. For the sixteen frame houses, without any land, same to be removed from the land.

Group 19. For the pipe line extending from the tract of land, hereinbefore described, to the pipe line of the Magnolia Petroleum Company near North Fort Worth, Texas, together with the right of way and franchise pertaining to same, to the extent that same are now in force and effect.

ALL BIDS MUST BE SUBMITTED TO AND ON BLANKS FURNISHED BY B. K. GOREE, RECEIVER, FT. WORTH NAT. BANK BLDG., FT. WORTH, TEXAS, LAMAR 164, OR H. H. DURSTON, 800 FT. WORTH CLUB BLDG., FT. WORTH, TEXAS

the exposure made in the hydraulic gravel pit on the Smith property in the northwest end of the hills. Here an excellent outcrop shows well bedded light buff colored sandy shale that strikes N. 10 degrees E. and dips N. 35 degrees W. This is the steepest dip found in the hills. Where this particular shale outcrops on the surface it has so badly weathered that the steep dip cannot be identified.

Structural Geology

The Baldwin Hills are near the northern end of the general line of uplifting that extends southeasterly to Newport. Most of the prominent topographic features in this general uplift have been proven to contain anticlines with commercial oil fields. The most prominent of these topographic features is the Baldwin Hills.

After these anticlinal structures were made the resulting hills were subject to a long period of erosion and base leveling before they were covered by Pleistocene sediments. By this time the greater part of their growth had been completed. This resulted in making a very marked angular uncomformity between the generally flat Pleistocene sediments and the folded Pliocene beds. At Huntington Beach over 1,200 feet of sediments were removed from the top of the fold before the Pleistocene sediments were deposited. Of course, where both the Pliocene and Pleistocene had low dips, this feature would not be so noticeable, but it would be noticeable along the structural high points of the general uplift; hence, the significance which attaches to the steep dip observed only in the hydraulic gravel pit.

Importance of Fault

The Baldwin Hills represent an elongated dome. Those beds that would have been associated with its northern plunge and western limb have been removed by the erosion which made the escarpments referred to under "Topography." The remainder of the hills to the east and south still represent the broad extended limbs and plunge of the anticlinal structure. Before the oil field was developed this condition was not understood. It was not until about 1921 to 1923 that the significance and importance of the fault running through the hills were recognized; and it was not until late in 1924 that definite proof was brought forward to show that the land on the western side of the fault was originally higher than the land lying on the eastern side of the fault. Lack of appreciation of this fact was largely responsible for the drilling of the dry holes east of the fault.

Assisted now by the definite proof of underground development work, it is impossible to appreciate the weight to which surface evidence in these hills was entitled.

Along the fault itself, pits were dug that showed very fine sandy gray shale faulted against fine yellowish brown sandstone and gray sands and gravel. While all of this material was very fine, that east of the fault was distinctly finer. The results of screening tests were as follows:

	On 100 mesh	On 150 mesh	Through 150 mesh
Sample west of fault	14.7%	57.5%	27.8%
Sample east of fault	11.6%	19.2%	69.2%

On the surface the fault shows a dip to the west at an angle of 24 degrees, but underground the dip apparently is not so great.

Evidence of Fault

One of the surface evidence of the existence of the fault is as follows:

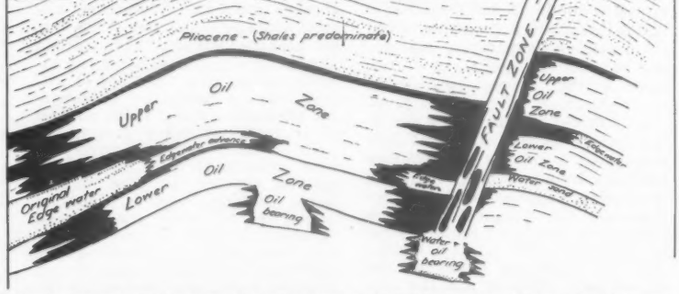
The Moynier water well drilled on the southeast corner of the property went through the lowest Pleistocene conglomerate at 80 feet or 120 feet above sea level. The lowest outcrop of the thin capping of Pleistocene gravel on the escarpment east of the fault is at an elevation of 450 feet. This gives a difference of 330 feet in the elevation of the gravel at the two points. An ideal section is submitted showing this condition.

Underground development work in the field shows that the oil-bearing beds east of the fault were lifted up, but that there was a drag near the fault; so that the shallowest showings of oil occur in the second line of wells east of the fault on the Pacific Baldwin property, rather than in the first line of wells east of the fault. A cross-section is submitted showing this condition.

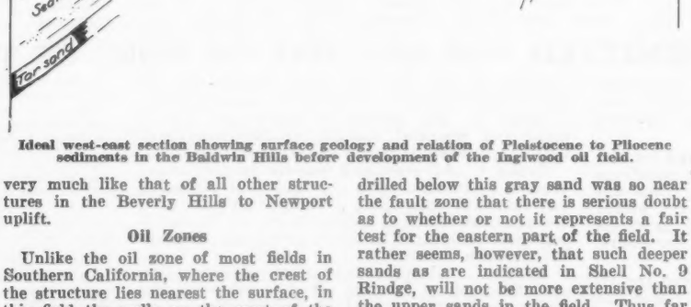
It was only natural, with much of the western lime of the anticline taken away by erosion; with the crest of the fold dropped by faulting and the eastern limb of the structure raised by the same faulting, so as to make the uplifted eastern limb of the structure the most prominent topographic feature in the hills; that the early development work treated the hills as a single structural unit. This resulted in the early prospect wells being drilled on the high topography and east of the fault.

Another theory was that if the hills represented a great structural feature, it was possible that erosion might have taken away the north limb thereof. Pacific No. 1 Baldwin was drilled with this thought in mind, but Pacific No. 2 Baldwin was drilled in a somewhat similar position, but for reasons involving the leasehold rights of the lessee.

The general direction of the underground structure is northwest-southeast, very much like that of all other structures in the Beverly Hills to Newport uplift.



Ideal west-east section through the Inglewood oil field, showing relation of Pleistocene to Pliocene sediments and upper and lower oil zones with edge water sands, also relation to fault to structure.



Ideal west-east section showing surface geology and relation of Pleistocene to Pliocene sediments in the Baldwin Hills before development of the Inglwood oil field.

Oil Zones

Unlike the oil zone of most fields in Southern California, where the crest of the structure lies nearest the surface, in this field the wells on the crest of the structure encountered their first oil showings at about 1,100 feet and made their water shut offs at 1,160 to 1,250 feet; and because of the fault and erosion the shallowest oil showings were those found in Standard No. 1 Los Angeles Investment Lease No. 1, and Pacific No. 24 Baldwin. In both of these wells oil showings were logged within 900 feet of the surface and Pacific No. 24 Baldwin has one of the shallowest water shut offs at 1,150 feet. The shallowest water shut off is that of Pacific No. 35 Baldwin at 1,100 feet.

In the Inglewood Field it has been the practice to pass up the top showings of heavy oil, owing to the presence of lenticular gray sand bodies within the first 50 or 100 feet of the zone. Enough wells made their first water shut offs too high to prove conclusively the presence of water in such gray sands and to justify what became the established practice in the field.

On the crest of the field the oil zone is about 1,300 feet thick. Around the rim of the field edgewater was found in the zone at about 600 to 800 feet from its top. With the rapid development and the withdrawal of oil from the zone, this edgewater has now encroached from the north in a southeasterly direction until it has reached the top of the structure. The 600 feet of formation lying above the edgewater is good for an average production of 200 to 400 bbls. The main production has come from the 400 feet of formation lying below the water, and varied from 1,000 to 4,000 bbls.

West of the fault, in the central part of the field, the total thickness of the oil zone has not yet been determined. Shell No. 9 Rindge demonstrated a total thickness of 1,658 feet, but other wells have not drilled into the zone so deep. The common practice has been to limit the penetration of the zone to 1,300 feet.

East of the fault the edgewater condition is found in wells far down the dip, lying in approximately the same position as west of the fault. Unfortunately, however, east of the fault development work has also found a gray sand lying within 350 and 400 feet below the intermediate water. The one well which drilled below this gray sand was so near the fault zone that there is serious doubt as to whether or not it represents a fair test for the eastern part of the field. It rather seems, however, that such deeper sands as are indicated in Shell No. 9 Rindge, will not be more extensive than the upper sands in the field. Thus far most of the deep test wells have been drilled outside of the present proven productive area, and little more is known concerning the absence or presence of the deeper sand than is demonstrated by the two wells mentioned above. That an additional oil zone will be developed in the future is certain, but one cannot safely forecast the extent or probable importance of such future development work.

Gravity of Crude

The oil which occurs above the edgewater varies in gravity from about 13 degrees to 18 degrees; that which occurs below the intermediate edgewater varies in gravity from 18 degrees to 22 degrees. The gravity of the oil produced by Shell's No. 9 Rindge, which penetrated 1,658 feet of zone is over 29 degrees. It is fair to assume, therefore, that the 358 feet of zone below the 1,300 feet generally developed, contains an oil even lighter than 29 degrees gravity. As is common in most California fields, the oil is heavier around the edges of the field. In those wells where edgewater is encountered the oil is particularly heavy.

In the cross-sections herewith, the zone has been divided into an upper and lower zone for the purpose of illustration, but in the field it has generally been treated as one unit, since most of the wells have taken all of the zone.

About 25 wells around the rim of the field cemented one string of pipe above the upper zone and a second string of pipe below the intermediate edgewater. These wells still remain clean, while neighboring wells higher up the dip are beginning to show water.

Field's Largest Well

The largest well in the field was Petroleum Securities' No. 9 Rubel, completed June 13, 1925, at a depth of 2,455 feet, with an initial production of 4,667 bbls. of 23.6 gravity oil. Owing to the fact that so many wells were completed almost at the same time, there were several other wells with a production nearly as great as this. Although the wells east of the fault were not completed during the months of June and July when peak production was secured, the fault has served as a protecting trap for such wells. Wells being completed now east of the fault show initial productions that compare very favorably with that of wells of similar structural position west of the fault that were completed during midsummer. The gravity of the oil east of the fault seems to be a little bit higher than the gravity of oil west of the fault.

Water Shutoffs

Test water shutoffs in the field at first proved difficult because of their shallow depth and the large sized casing used. Bailing the holes nearly dry caused the formations to heave and damaged the shoe of the water string. This led to the almost universal acceptance in testing water shutoffs of a practice followed to a limited degree in some other fields. This practice is to run in a testing string extending about 5 feet below the shoe of the water string. The bottom joint on the testing string is perforated pipe and the lower end is closed. This prevented the formation from heaving and permitted bailing the well to a reasonable depth.

Casing programs have varied according to operating companies. Some have set 18-inch and 15½-inch conductor strings and 12½-inch water strings, but most companies have eliminated the conductor string and have used only 11-inch water strings. In the first new wells there were a few 10-inch oil strings. These proved unsatisfactory and as a result most of the oil strings are 8¼-inch casing. Those wells setting a second water string below the intermediate edgewater used 8¼-inch casing for this purpose and consequently have a 6¼-inch oil string.

Coring

Owing to the fact that it has cost very little more to core a well than to drill it without coring, many of the wells around the rim of the field have been cored continually from about 1,000 feet. This has proven particularly advantageous since such work has permitted penetrating all of the oil-bearing sands. The less attractive looking, or gray sands that were encountered were plugged off with cement prior to landing the oil string.

Continuous coring and this method of plugging off gray sands have been used so successfully and frequently in the field that they represent an advance development in the art of drilling wells contributed distinctly by the Inglewood Field.

Character of Gas and Oil

Even though the gasoline content of the gas in the Inglewood Field has been low, there is sufficient gasoline in the natural gas to warrant the erection of gasoline plants. Natural gas has also been taken from the field, and there has been very little, if any, waste of oil or gas.

The oil generally is classified as a heavy oil, since the bulk of it carries only 12 to 16 per cent gasoline. The oil from the central part of the field contains as much as 20 to 25 per cent gasoline. With the decline in production

(Continued on Page 180)

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We have tried and tested every conceivable type of thread for sucker rod service. As far back as 1914 we tried various types of threads. The Axelson Vanishing Thread is the outgrowth of those years of research. It has been designed for sucker rod service exclusively and performance records in every field verify our claim that it is the strongest thread ever conceived.

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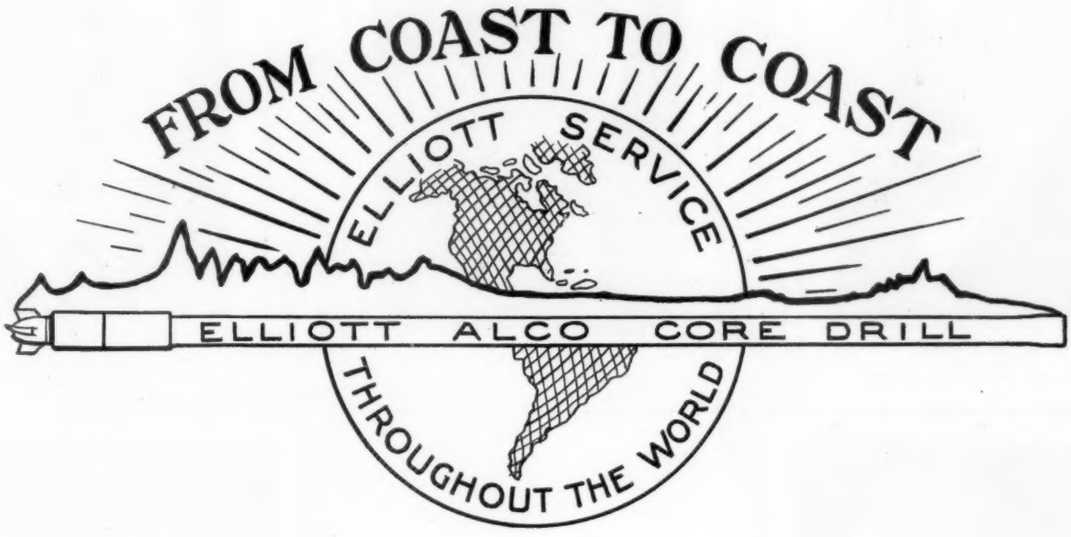

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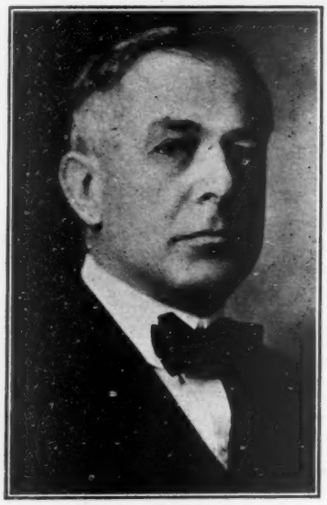

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Spang Pumping Jacks can also be furnished with auxiliary reel for pulling and coiling wire pumping lines.

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TEN HORSE POWER: Equipped with Two-Cycle Engine to operate on natural gas and with hot tube ignition.

Approximate weight, 7200 pounds. Price.....**$950.00**

Auxiliary Reel for Pumping Line. Price extra...**$275.00**
Note: Also made with four-cycle engine.

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Approximate weight 9,000 pounds. Price.....**$1100.00**

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EXTRAS

For equipping with Wico Electric Ignition.....**$ 60.00**

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Fuels for High Compression Engines

Characteristics With Reference to Preignition and Detonation Are of the Utmost Importance

By Stanwood W. Sparrow[1]
Automotive Power Plants Section, Bureau of Standards

From theoretical consideration one would expect an increase in power and thermal efficiency to result from increasing the compression ratio of an internal combustion engine. In reality it is upon the expansion ratio that the power and thermal efficiency depend but since in conventional engines this is equal to the compression ratio, it is generally understood that a change in one ratio is accompanied by an equal change in the other. Tests over a wide range of compression ratios (extending to ratios as high as 14:1) have shown that ordinarily

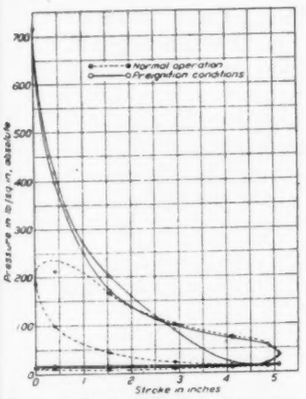

Fig. 1—Altitude, 7,000 feet; barometer, 57.8 cm. Hg.; compression ratio, 8.3; R.P.M., 1600.

an increase in power and thermal efficiency is obtained as expected, provided serious detonation or preignition does not result from the increase in ratio.

There are marked differences between fuels as regards the conditions under which they detonate or preignite. It follows that the employment of a high compression ratio is contingent upon securing a fuel which is suitable in its resistance to preignition and detonation and which at the same time possesses the other qualities essential to a satisfactory engine fuel.

This report is based very largely upon tests made at the Bureau of Standards during 1922, 1923 and 1924. It emphasizes the fact that there may be a difference between a fuel's ability to resist detonation and its ability to resist preignition. Although this report is primarily a general discussion of the properties essential to a satisfactory fuel for high compression engines, certain fuels, benzol and alcohol in particular, are discussed in some detail.

Introduction

During the World War the Bureau of Standards conducted an extensive investigation of fuels for aircraft engines. Results were published in Report No. 47 of the National Advisory Committee for Aeronautics entitled "Power Characteristics of Fuels for Aircraft Engines." That this report (No. 47) does not mention detonation or preignition is sufficient as indicating that at this time the importance of these phenomena was not generally appreciated.

As aviation developed, compression ratios were increased and preignition and detonation occurred more frequently. Ricardo in Great Britain and Midgley in the United States were among the first to draw attention to the seriousness of detonation. The first work at the Bureau of Standards distinctly devoted to fuels for high compression engines, is discussed in Reports 89 and 90 of the National Advisory Committee for Aeronautics. It consisted of tests of two fuels, Alcogas and Hecter, in an aviation engine of 7.2 compression ratio. Subsequently, a more general study of fuels for high compression engines was authorized by the National Advisory Committee for Aeronautics and from time to time the performance of special fuels has been measured for the Bureau of Aeronautics of the Navy Department.

While a single cylinder engine has been employed extensively in this research, results have been checked frequently by means of multi-cylinder aviation engines. In some cases the immediate problem has been to select the most suitable fuel for an engine of a given compression ratio whereas in other cases it has been to determine the best combination of compression ratio and fuel for a given purpose. While the number of fuels investigated has not been large it is believed that sufficient information has been obtained to form a satisfactory basis for discussing the characteristics of a fuel which determine its suitability for use in high compression engines.

Fuels for High-Compression Engines

As already mentioned, the characteristics of a fuel with reference to preignition and detonation are of the utmost importance as regards its suitability for high compression engines. Hence these two phenomena will be discussed first.

Preignition—Definition and Description

Preignition as used in this paper is defined as ignition from any source prior to the time at which ignition is desired. The term ante-ignition ordinarily is used with reference to an engine such as the Diesel in which ignition is effected by the generation of heat within the engine cylinder. Preignition usually is a special case of ante-ignition. If an engine continues to fire after the ignition switch is opened it is an evidence of ante-ignition, but not necessarily of preignition. The ante-ignition, may occur when the piston is nearly at top center somewhat after the time at which the igniting spark would occur in normal operation. The operation of the engine may be uninfluenced by the fact that had the spark not occurred ante-ignition would have taken place. However, when an engine gives evidence of ante-ignition preignition may reasonably be expected to follow as soon as conditions become slightly more severe.

The usual consequences of serious preignition are a decrease in engine power and abnormally high pressures and temperatures of the working fluid. Evidence that preignition is occurring is usually furnished by a decrease in power and high heat dissipation to the jacket water. Evidence that preignition has occurred may be furnished by melted spark plug electrodes, burned valves, fractured or melted portions of piston heads, etc. Similar effects sometimes result from detonation as will be discussed later.

Why Preignition Causes High Pressures, Temperatures, and Loss of Power

Preignition causes an increase in maximum temperature because (1) it increases the amount of charge which is compressed after combustion; (2) combustion produces an increase in temperature that is practically independent of the temperature before combustion; and (3) compression in the engine cylinder multiplies the absolute temperature by a factor which is greater than one and independent of the temperature. The earlier in the compression stroke combustion occurs, the greater will be the ratio to which the charge which is burned will be compressed and hence the higher will be the temperature at the end of the stroke.

Preignition will increase the pressure at the end of the compression stroke in the same ratio that it does the absolute temperature. This is a consequence of the fact that preignition does not alter appreciably the amount of charge which enters the engine in unit time and that at constant volume pressure is directly proportional to the absolute temperature.

The effects of preignition may be small or large, depending upon the severity of the phenomenon. If the preignition is slight the sole consequence may be a small reduction in engine power and economy comparable to what would result from a too far advanced spark. Mild preignition, however, is very apt to develop into that which is severe. A probable sequence of events is as follows: The first occurrence of preignition even though it is slight causes an increase in the average temperature of the cycle. This causes the phenomenon to take place earlier in the succeeding cycle. The process continues until eventually the fresh charge is ignited as it enters the cylinder and no power is developed. Figure 1 shows an actual indicator card taken with an engine preigniting. The power developed in the preigniting cylinder was negative, that

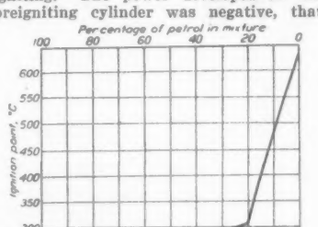

Fig. 2—Ignition points of mixtures of benzol (crystallized) and petrol. (From "Spontaneous Ignition—Temperatures of Liquid Fuels," by Harold Moore. "The Automobile Engineer," May, 1920.)

is to say, a portion of the power developed by the other cylinders was employed in overcoming the resistance which it offered.

Cause of Preignition

Preignition is the result of heating a portion of the charge to such a temperature that it ignites. There are many factors which influence the temperature reached by portions of the charge prior to ignition. These include the temperature of the air entering the carburetor, the amount of heat supplied to the charge in its passage to the cylinder, the compression ratio, the amount and temperature of the exhaust gases in the clearance space, and the amount and rate of heat transfer to the charge from various hot portions of the combustion chamber.

In many instances the course of preignition is some portion of the combustion chamber whose temperature normally is much higher than that of other portions of the combustion chamber or of the charge itself. In such cases preignition depends upon the temperature of the hot point, the temperature of the charge, and the rate at which the charge passes the hot point.

There are reasons to believe that slight preignition may often exist without being recognized as such and without causing any appreciable harm. This is possible if the actual amount burned before the charge is ignited from its normal source is sufficiently small. Engine speed may be important in its effect upon the time available per cycle during which the slight preignition may reach serious proportions. That such is the case is suggested by the fact that engines which operate at normal speeds without any signs of preignition or ante-ignition will continue to fire after the ignition circuit has been opened and the engine speed has dropped to a very low value. There is no apparent reason why any portion of the combustion chamber under those conditions, should be hotter than or even as hot as at normal speed and full load. The probable explanation is that at low speeds the time interval corresponding to a few degrees of crank action is sufficient to permit a hot portion of the combustion chamber to ignite the charge. At normal engine speeds the time interval corresponding to the same number of degrees might be too short to permit ignition.

The velocity with which the charge flows to the engine has an influence upon the consequences of preignition. If this velocity is greater than the velocity with which flame is propagated, even though preignition in one cylinder of a multi-cylinder engine may be so severe that the charge is ignited as it enters, there may be no external evidence other than a loss in power. At lower charge velocities, however, the flame may rush back and cause explosions in manifold and carburetor. Either condition is likely to be encountered in the normal range of engine speeds.

Compression Ratio and Preignition[2]

It is generally—and in so far as is now known correctly—believed that the likelihood of preignition increases with the compression ratio of an engine. Not all of the changes which accompany an increase in compression ratio, however, increase the engine's tendency to preignite. For this reason an increase in ratio often increases troubles due to preignition to a much less extent than anticipated. As has been shown, the ratio between the temperature at the end and at the beginning of the compression stroke increases with increase in ratio. Hence, charge temperatures during the compression stroke are higher the higher the compression ratio. This, to be sure, increases the tendency for the engine to preignite. On the other hand, because of the decrease in clearance volume with increase in ratio and the decrease in temperature of the exhaust gases, less heating will result from the mixing of the fresh charge with the gases remaining in the clearance space. This tends to decrease the temperature of the charge during the compression stroke and consequently the engine's tendency to preignite. Because of the increase in expansion ratio (expansion and compression ratios are equal in conventional engines) the average temperature during the cycle decreases with increase in compression ratio. Hence the temperature of spark plug electrodes, valves, etc., will be correspondingly decreased and likewise the probability that they will cause preignition.

Comparing Fuels With Respect to Preignition

It is not altogether certain by what

[1] The late S. M. Lee and Messrs. Brooks, Bender, Paul and Ragsdale, have had a major share in the obtaining of the information contained in this report.

[2] For a more detailed discussion, see Report No. 305 of the National Advisory Committee for Aeronautics, entitled "The Effect of Changes in Compression Ratio Upon Engine Performance."

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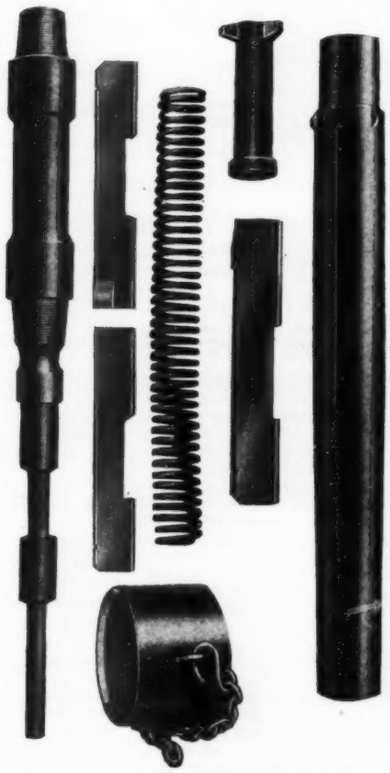

Parts consist of mandrel, three steel cutters, tempered tension spring, sleeve and one-piece body. A tripping collar is also supplied to hold the cutters in collapsed position before running in. The collar slips off as the reamer passes through the rotary table. The cutters expand in passing the casing shoe and collapse when lifted. All parts are interchangeable.

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characteristics of a fuel its tendency to preignite can best be gauged. At present the so-called spontaneous ignition temperature appears to form the most satisfactory basis for estimating the relative ability of various fuels to resist preignition. Spontaneous ignition temperatures, however, cannot be taken as indicating the temperatures at which ignition will take place in the engine cylinder and in fact values obtained by various investigators differ considerably. This can be attributed to differences in methods of measurement.

A rather brief but nevertheless fairly complete review of work on the spontaneous ignition temperatures of liquid fuels

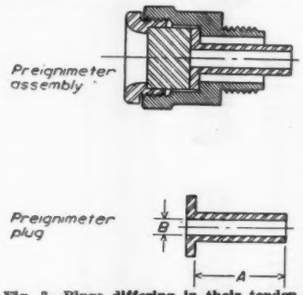

Fig. 3—Plugs differing in their tendencies to cause preignition are obtained by varying dimensions A and B.

is given by Moore in "The Automobile Engineer" of May, 1920. He defines the temperature of spontaneous ignition as "the temperature at which a substance surrounded by oxygen or air at the same temperature will burst into flame without the application of any spark or other local high temperature." Such a condition may exist when starting an engine of the Diesel type as the charge in such case is likely to be at a temperature which is nearly uniform throughout and considerably higher than the temperature of surrounding metal parts. In the normal operation of most engines some portion of the combustion chamber is hotter than the charge so that the condition of "no local high temperature" is not met. In the ingenious device used by Ricardo[3] for obtaining spontaneous ignition temperatures there should be no local hot spots and hence one would expect the values to be true spontaneous ignition temperatures as defined. Even results obtained by this method, however, do not appear to permit direct application to engine conditions.

Moore, in the article referred to, discusses the spontaneous ignition temperatures of blended fuels and draws attention to the very interesting condition shown graphically in Figure 2. In this figure which is typical of all the blends tested by Moore, the spontaneous ignition temperature of the blend is shown to be very nearly the same as that of the constituent which has the lower ignition temperature except when this constituent forms only a small proportion of the blend. The spontaneous ignition temperature then becomes nearly the same as that of the constituent, having the higher temperature. This change of spontaneous ignition temperature is brought about by a rather small change of blend proportions. It is rather to be expected that this characteristic will be somewhat less marked in actual engine operation for the reason that preignition often results from the high temperatures due to detonation and detonation varies much more uniformly with change of blend proportions than do spontaneous ignition temperatures.

At the present time the Bureau of Standards is developing an instrument for use in comparing fuels with respect to preignition. A description of the instrument in its present form will serve to illustrate the objects sought and probable method of use even though the instrument as finally developed may be radically different. As will be noted in sketch, Figure 3, the instrument consists of a housing which may be screwed into the engine cylinder and plugs of various cross section and lengths which may be clamped in this housing.[4] Essentially the device is a definite artificially constructed hot spot whose high temperature is attained by exposing a large amount of metal to the burning charge while preventing, so far as is feasible, the conduction of heat from this metal.

There are two general methods by which this instrument may be used in comparing fuels. The first method consists in determining for each fuel which of the various plugs can be used without causing preignition. Comparisons are made under certain fixed conditions of engine speed, load, and compression ratio. In the second method the same plug is used with both fuels and the comparison is based upon the relative loads or compression ratios with which satisfactory operation is obtained.

It is to be expected that the relative grouping of fuels as regards preignition will be the same with either method of test. If it is not it suggests that the relative merits of those fuels may not be the same for different types of engines. When fuels are compared on the basis of permissible load or compression ratio but without using a preignimeter, there is no assurance as to what is the hottest portion of the combustion chamber or as to its constancy. The preignimeter to a great extent overcomes this

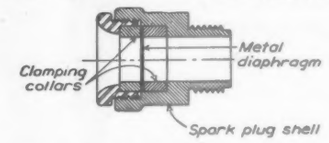

Fig. 4—Device for comparing maximum pressures.

difficulty and should make it possible to obtain measurements of greater reliability.

Detonation—Definition and Description

Detonation may be defined as a combustion phenomonen whose best recognized manifestation is the ringing sound which sometimes accompanies a too far advanced spark. In the motor car engine the noise itself is objectionable, whereas in aviation engines detonation is to be feared because of the extremely high pressures and temperatures which it causes. Serious detonation, aside from its destructive effects, is objectionable in that it results in a decrease in power and an increase in the amount of heat rejected to the jacket water which, in turn, necessitates greater radiator capacity.

Detonation—Methods of Measure

Ricardo rates fuels by what he calls "toluene values." He defines the toluene value as "the tendency of a fuel to detonate in terms of its equivalent toluene content, taking standard aromatic gasoline as having more toluene value and toluene as having a value of 100. It should be noted that toluene values are not independent of the method of measurement. Ricardo used both a variable compression and a supercharging engine. In one instance a toluene value of 28 was obtained with one engine and a value of 18 with the other. For another fuel the value obtained with one engine was 35 and with the other 24. Ricardo made tests of a large number of fuels and assigned to them toluene values. This work is described at length in the "Automobile Engineer" of February to August, 1921, and in "Automotive Industries" of April to September, 1921.

Midgley measures detonation by what he terms a "bouncing pin."[5] The instrument is screwed into the cylinder and is so constructed that a portion of it forms what is essentially a small, thin-walled section of the combustion chamber. One end of the bouncing pin rests upon this wall. The pin is so guided that its motion is perpendicular to this wall and motion in this direction is resisted by a spring which, when sufficiently deflected, closes an electric circuit. As long as the circuit remains closed current flows through a solution of 10 per cent sulphuric acid. As a result gas is evolved and this is collected and measured. The amount of gas evolved in unit time serves as a measure of the detonation.

As has been stated, in so far as aviation engines are concerned, the seriousness of detonation lies in its destructive effect. Direct measurements of this effect have been made by noting the time required to rupture a diaphragm of given thickness when the diaphragm is exposed to the pressures in the engine cylinder. The device used at the Bureau of Standards is shown in Figure 4, and is described in Technical Note No. 101 of the National Advisory Committee for Aeronautics. In this device the metal disc which serves as a diaphragm is mounted between two metal washers in a spark plug shell. The thickness is selected so that when the disc is subjected to explosion pressure of the engine the exposed portion will be sheared from the rim in a comparatively short time. Aluminum discs ranging in thickness from .010 to .040 inch have been used for the most part.

Characteristics of fuels with respect to detonation may also be determined by means of an engine having a compression ratio so high that satisfactory full throttle operation is not possible with any of the fuels under comparison. For each fuel the maximum throttle opening at which the engine can operate with no detonation or with no serious detonation, is determined and the indicated horsepower developed under these conditions is measured. The comparison of the fuels is based upon the measurements of horsepower thus obtained. It will be noted that this method requires for its application an independent method for determining the presence of detonation or of "serious" detonation.

Difficulties in Distinguishing Between Preignition and Detonation

The chief difficulty in measuring preignition and detonation lies in the fact that although these are distinct phenomena each may produce, and usually is accompanied by, the other. It is important, however, to distinguish between the two phenomena when rating fuels as the value of a fuel in one type of engine may be dependent upon its resistance to preignition and in another type upon its resistance to detonation.

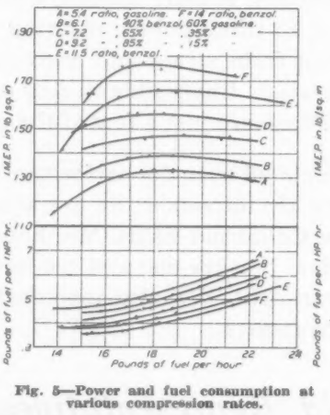
A=5.4 ratio, gasoline. F=14 ratio, benzol
B=6.1 " 40% benzol, 60% gasoline.
C=7.2 " 65% " 35% "
D=9.2 " 85% " 15% "
E=11.5 ratio, benzol.
I.M.E.P. in lb/sq in.
Pounds of fuel per I.H.P. hr.
Pounds of fuel per hour

Fig. 5—Power and fuel consumption at various compression rates.

Both preignition and detonation are affected by spark advance, fuel-air ratio, and general engine condition. The usual requirement that comparisons be made under the same conditions is applicable, but this does not mean necessarily with the same spark advance or the same fuel-air ratio. It usually means with the fuel-air ratio giving maximum power or some definite percentage of maximum power and with the spark advance giving the maximum power with this ratio. If there are large differences between the rates of flame spread of two fuels then there will be large differences in the spark advances at which the two fuels should be compared. This discussion of the difficulties in measuring preignition and detonation has not been introduced with any thought that these difficulties are insurmountable, but rather to emphasize the fact that a necessary preliminary to such measurements is often a rather complete series of tests at various throttle openings, fuel-air ratio and spark advances.

From the foregoing it is evident that the ability of an engine to operate at a certain compression ratio and compression pressure does not prove that another type engine will operate satisfactorily with the same fuel at the same ratio and pressure. Usually, however, if two fuels are compared in Engine A and the performance of one of these fuels in Engine B is known, it is possible to estimate rather closely the performance of the other fuel in Engine B.

Before considering specific fuels it seems advisable to discuss briefly some of the other factors which affect the value of a fuel for use in internal combustion engines. No attempt will be made to list these factors in the order of their importance as this depends upon the service to which the engine is devoted. Availability, price, calorific value, explosive range, distillation range, latent heat of evaporation, freezing point, separation, viscosity, corrosiveness, specific gravity, chemical composition and rate of flame propagation are to be discussed.

Availability

An aviation engine is to a considerable extent built to "fit" its fuel. Its compression ratio is as high as is considered safe for this particular fuel, its carburetor jets are of the size which will meter the proper amounts of this fuel. It is essential, therefore, that this or a fuel which can be used equally satisfactorily in the same equipment be available wherever the airplane is likely to land.

From a military standpoint it is essential to know to what extent a fuel will be available in time of war. Some European countries import the bulk of their fuel. In the event of war this source of supply might be entirely cut off. Benzol, xylol and toluol possess desirable antiknock properties, but the objection is frequently raised that in the event of war the output of toluol, at least, might be required for the manufacture of explosives.

Prices

An airplane permits more rapid transportation than is possible by other means. The higher its speed, the more desirable for this purpose it becomes.

Any increase in engine power which does not involve an increase in the overall weight of the airplane makes possible an increase in speed. Obviously, if one fuel permits an engine to develop more power than another, it will demand a much

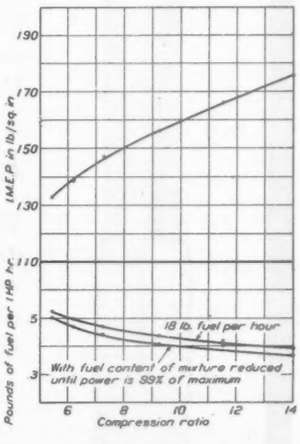
I.M.E.P. in lb/sq in.
Pounds of fuel per I.H.P. hr.
18 lb. fuel per hour
With fuel content of mixture reduced until power is 99% of maximum
Compression ratio

Fig. 6—Effects of compression ratio on power and fuel consumption. (Benzol-gasoline blends.)

higher price as the cost of fuel is but a small percentage of the total cost of operating an airplane. No argument is necessary as to the value of any changes in fuel characteristics which increase the reliability of the power plant. In the case of a combat airplane, differences in fuel characteristics are of the utmost importance. The lack of a few horsepower

[3] "Recent Research Work on the Internal Combustion Engine," by Harry R. Ricardo. "Automotive Industries," January 19, 1923.

[4] Another possibility is to use a single plug electrically heated. The temperature could then be changed at will and the amount of change could be estimated rather closely from electrical measurements.

[5] "Journal of the Society of Automotive Engineers," January, 1922.

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Coming out of the hole with a fishtail bit, it is only necessary to break out that bit and screw in the Reed Rock Bit, as the Reamer Collar has been threaded to fit the same drill stem. There is no delay, as the Reed Rock Bit may be made up just as quickly as could a fishtail, inasmuch as there is no lubricator to fool with, no extra joint of pipe to be made up and figured into the log calculation, and no messing around with a lot of oil and grease, refilling a lubricator and making sure it will work.

Going back in the hole, the driller is permitted to open up his slush pump and continue drilling until either the rock has been made or cutters have been worn down, in which case he comes out of the hole and by simply loosening one set-screw, makes a complete change of cutters and is ready to go back easily within ten minutes of time, instead of devoting two or three hours to breaking down the entire bit, disconnecting from lubricator, opening and changing.

The Reed Rock Bit is much more easily handled on the derrick floor than any other rock bit known.

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REED ROCK BITS

may cause the death of the pilot and the destruction of the airplane. For those reasons it does not now appear probable that the selection of fuel on the basis of price is likely, except when the fuels under consideration are of nearly equal merit.

Colorific Values

Goodenough[6] defines calorific power as follows: "The union of a combustible with oxygen produces heat and the heat thus generated when one pound of combustible is completely burned is called the heating value or calorific power of the combustible." When not otherwise specified calorific power is understood to be based on unit weight. It is equally important, however, to know the calorific power of a fuel per unit volume and per unit volume of combustible mixture. For aviation engines it is desirable that the fuel be of high calorific power per unit weight as minimum weight is one of the chief aims of both engine and airplane designer. High calorific power per unit volume is also desirable as it permits the use of a small fuel tank with a consequent low weight and wind resistance. Probably the most important value, however, is that based on unit volume of combustible mixture. Upon this value the power obtainable from a given engine depends. The fuel ordinarily constitutes a small proportion of the total volume of the charge. As the volume of charge received by the engine in unit time is but slightly dependent upon the fuel used, then it follows that the power developed by the engine will be almost directly proportional to the calorific value of the fuel per unit volume of combustible mixture.[7] Ricardo, from his investigations,[8] concluded that the total energy obtainable per unit volume of combustible mixture differs by less than 3 per cent for mixtures of air and hexane, heptane, benzene, toluene, xylene, or ethyl alcohol.

Hydrogen furnishes a rather good illustration of the necessity for specifying whether calorific values are based

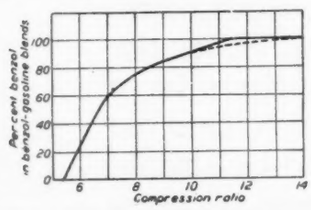

Fig. 7—Percentages of "motor benzol" in benzol-gasoline blends. One-cylinder engine; bore, 5 inches; stroke, 7 inches; R.P.M., 1500. (Percentages will be different for other types of engines.)

upon unit weight, unit volume or unit volume of combustible mixture. The calorific value of hydrogen per pound is nearly three times as great as that of gasoline whereas the calorific power of a cubic foot of combustible mixture of gasoline and air is between 10 and 20 per cent greater than that of a cubic foot of combustible mixture of hydrogen and air.

Explosive Range

The term explosive range refers to the limits between which the fuel vapor-air mixture is combustible. Narrowing this range increases the difficulty of engine operation. Much of the data which are available on the explosive range of mixtures of gasoline vapor and air have been derived from laboratory experiments with glass bombs in which conditions were considerably different from those which exist in the engine cylinder, both as regards the rate of heat dissipation, turbulence, and amount of inert gas present. Obviously such measurements are not directly applicable to engine operation. It is reasonable to expect, however, that a fuel shown by such tests to possess a greater explosive range than another will have a greater range than the other when used in the engine.

Distillation Range

Distillation characteristics of a fuel are ordinarily shown by curves in which temperatures are plotted against "per cent distilled." These curves are valuable as a means of identifying fuels and

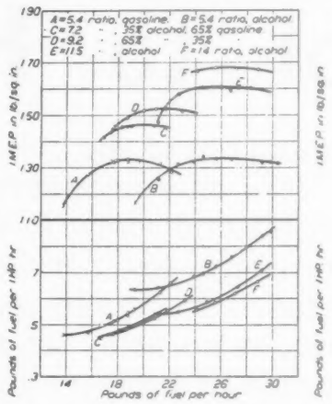

Fig. 8—Power and fuel consumption at various compression ratios.

indicating their suitability for a given type of service.

It is quite generally believed that the more volatile a fuel, the more suitable it is for aviation work. To a certain extent this is true, inasmuch as the more readily a fuel vaporizes the more easily is it distributed and prepared for combustion. It is somewhat less generally appreciated that a fuel may be objectionable from the standpoint of being too volatile. The objection to such a fuel arises from the fact that it vaporizes in the carburetor and fuel lines thus restricting the flow of fuel and interfering with the metering characteristics of the carburetor. This condition is commonly known as "vapor lock." What makes this trouble particularly serious is the difficulty of detecting it. Vapor may form in a fuel line and restrict the flow to such an extent as to cause the performance of the engine to be extremely erratic and yet this vapor may entirely disappear before an examination of carburetor and fuel lines can be made.

In 1924 the United States Government had two specifications for aviation gasoline. The more volatile fuel is termed "Fighting Grade" and is intended to be used "as a fuel for fighting airplanes where the highest efficiency is required." The superiority of this fuel to the "Domestic Grade" for military purposes is questionable in the light of present knowledge as to the seriousness of this trouble from vapor lock. Combat airplanes are capable of climbing very rapidly. As a result there is a considerable reduction in the absolute pressure on the fuel system before the temperature of the fuel drops in accordance with the low temperatures which prevail at high altitudes. This is the condition most likely to produce trouble from vapor lock and the more volatile the fuel the more easily is such trouble produced.

Extremely high volatility is also undesirable in a fuel because of the resultant waste from evaporation in storage and because of the fire hazard. To minimize the danger from fire repeated attempts have been made to adopt Diesel or other engines using heavy oils instead of gasoline to aviation uses. The ignition temperature of such fuels may be even lower than that of gasoline but the possibility of explosions or of the extremely rapid spread of fire is much less since less vapor is present.

Latent Heat of Evaporation

The latent heat of evaporation of a fuel at a given temperature is the amount of heat required to vaporize a unit weight at that temperature. A low latent heat is a desirable characteristic in so far as it reduces the amount of heating of the charge necessary to secure adequate vaporization. Ricardo, in certain experiments with alcohol[9], found that power increased as the richness of mixture was increased until the mixture had been enriched to a far greater extent than would appear necessary from the chemical characteristics of the fuel. This he attributed to an increase in volumetric efficiency brought about by the large amount of heat abstracted from the charge in the evaporization of the alcohol. This amount would increase with enrichment of the mixture. This is an instance where high latent heat might be considered of value inasmuch as it permits the development of higher power than would otherwise be possible.

It may be well at this time to mention an extremely undesirable effect which may result from the drop in temperature due to the vaporization which takes place in the intake system of an engine. The effect referred to is the formation of snow. This snow is very apt to collect around the engine throttle although it may cling to any portion of the intake system. Two conditions are necessary for its formation: (1) the air entering the carburetor must contain a considerable amount of moisture, and (2) the vaporization must cause the temperature of the charge or of a portion of the charge to drop below the freezing point of water. Obviously the remedy is to supply sufficient heat to prevent such a temperature drop. An amount of heat equal to the latent heat of evaporation should be adequate for this purpose.

The effect of this snow formation upon engine operation is very serious. It throttles and thus decreases the power of

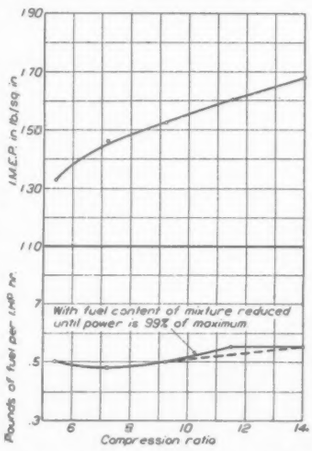

Fig. 9—Effect of compression ratio on power and fuel consumption; (alcohol-gasoline blends); one-cylinder engine. R.P.M., 1500; bore, 5 inches; stroke, 7 inches.

the engine. This may eventually force the airplane to the ground because of insufficient power. When the changes in power take place suddenly conditions are most serious. This occurs when a considerable quantity of snow collects and subsequently becomes dislodged due to vibration of the engine, or movement of the throttle, or a change in manifold suction. The effect is that of an uncontrolled and rapidly fluctuating throttle. Needless to say, flight under such conditions is extremely dangerous.

Freezing Point

If a fuel freezes at any of the temperatures encountered in normal service, this fact constitutes a serious objection to its use. Most fuels satisfactory in other respects are satisfactory in this also. Benzol is an exception, freezing at temperatures normally prevailing at moderately high altitudes. Fuel sold under the designation "motor benzol" ordinarily contains sufficient toluol to lower the freezing point materially.

Separation

There may be some conditions under which one constituent of a blended fuel separates from the remainder. These will be discussed later in more detail in relation to certain of the more common blends. The merits of a blended fuel disappear when the fuel ceases to be a blend. An unusually serious situation results when one of the constituents of the blend is an antiknock agent. The use of the fuel from which the antiknock constituent has separated is likely to result not only in poor operation but in engine destruction.

Viscosity

So long as a fuel can be metered satisfactorily in the conventional type of carburetor, its actual viscosity is of minor importance. Information should be available, however, as to the extent to which viscosity is affected by temperature and if a change in fuels is to be made the difference in their viscosities should be known. The magnitude of the influ-

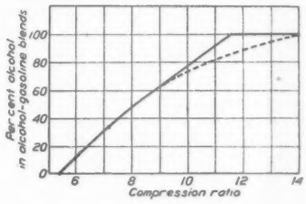

Fig. 10—Percentage of alcohol in alcohol-gasoline blends. One-cylinder engine; bore, 5 inches; stroke, 7 inches; R.P.M., 1500. (Percentages will be different in other types of engines.)

ence of changes in viscosity upon the rate of fuel flow depends upon the design of the fuel metering device. If the design is such that viscosity materially affects the rate of fuel flow then when a change in fuels is made the change in carburetor jet sizes must be governed by the differences in viscosity as well as in the density of the fuel and its combining proportions.

Corrosiveness and Tendency to Form Gums

Engine failure is more likely to prove disastrous in the case of the airplane than in other types of automotive transportation. Hence the tendency of a fuel to cause corrosion or to form gums is more objectionable when the fuel is to be used for aviation than when it is to be used for other purposes. Unfortunately some of the fuels which have desirable antiknock characteristics seem to be rather unsatisfactory with respect to corrosiveness and the tendency to form gums. It is believed that in many cases this condition could be remedied by further refining if the demand were sufficient to warrant it.

Specific Gravity

Mention is made of specific gravity merely to call attention to the fact that it is not a reliable indication of the value of a fuel although at one time it was much used for that purpose. Provided the comparison is made between hydro-carbon fuels of the same series an idea as to the relative volatility of such fuels may be obtained from their specific gravities. This is not true when the fuels are not of the same series. Benzol, for example, has a higher specific gravity than the usual grade of motor car gasoline but it is much more volatile. At the present time distillation data have replaced measurements of specific gravity almost entirely as a means of comparing fuels.

A change of specific gravity will change the metering characteristics of the carburetor. This influence is ordinarily considered in connection with the change of viscosity which also results from a change of fuel.

Chemical Composition

By ultimate analysis and other chemical and physical tests it is usually possible to determine the chemical composition of a fuel, its proportion of aromatics, etc. This information may be of scientific interest and is an aid in predicting the fuel's performance. Usually, however, it is easier to measure performance directly than to make a determination of chemical composition. Hence complete chemical analyses are not ordinarily made in the examination of a fuel to determine its suitability for use in high compression engines. Nevertheless

(Continued on Page 184)

[6]See Marks' "Mechanical Engineers Handbook," footnote on Page 363.

[7]It is assumed throughout the discussion that the combustible mixture consists of fuel and air. If the mixture consists of fuel and oxygen its calorific value per unit volume of combustible mixture will be much lighter.

[8]See "Automotive Industries," July 7, 1921. 1921.

[9]See "Automotive Industries," July 7, 1921.

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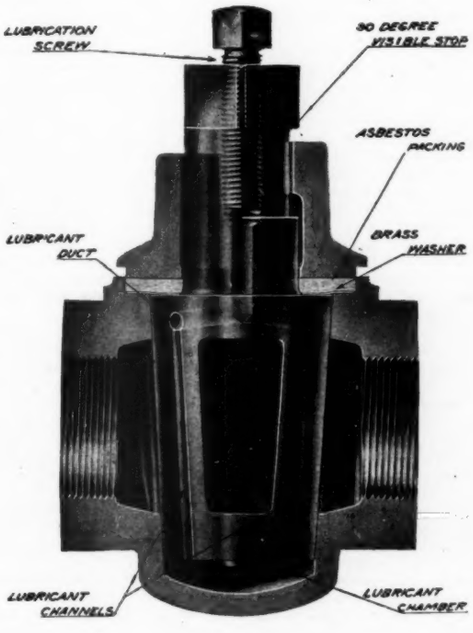

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AGENCIES IN PRINCIPAL CITIES

What An Oil Writer Saw in Havana

Island's Lone Refinery in Beautiful Setting. No Filling Stations and Seemingly No Traffic Laws. Protest Gasoline Tax

By C. D. Lockwood

Across the bay from Havana, partly concealed from the view of incoming vessels by innumerable sailing craft riding lazily at anchor, is one of the most beautiful spots in that delightful land known as the "Pearl of the Antilles." Tourists in their frenzied rush along the well-traveled trails from Morro Castle to Cabano Fortress, the race track and Casino, punctured with breathing spells at convenient corners where old familiar odors advertise the fact that the bottled "Breath of Life" may be secured, rarely if ever visit this little corner of the tropical isle, although it is less than 10 minutes by motor boat from the city. Indeed, many of Havana's most influential citizens were surprised not long ago at a luncheon to learn that it was there. But to the visiting oil man this spot is a point of especial interest for it is the headquarters of just about all of the oil industry that Cuba boasts, the refinery of the West India Oil & Refining Co. of Cuba, a Standard Oil Co. of New Jersey subsidiary.

Lest the misleading impression be created that a refinery is ever a thing of beauty and a joy forever, it should be made clear that the aesthetic appeal made upon the writer when he first came in sight of the West India plant was due to the fact that the refinery itself is concealed from the water front by an effective screen of tropical verdure, contrasting vividly with the impressive white columns of the office buildings among the royal palms.

Havana's Refinery

I introduced myself to one Jimmy Gregory, acting manager of the plant, and was shown about the place. The five crude stills with a daily capacity of 4,000 bbls. were running oil from the Mexia and Powell Fields, I was told, which made me feel right at home. There were two complete cracking units, and another under construction although work on it had been suspended temporarily because of economic conditions on the island. The equipment includes also four pressure stills, three steam stills, one bubble tower steam still, as well as everything else necessary for the manufacture of all products from gasoline to wax.

All of which is a valiant effort to prove solemnly that an oil writer might be called to Cuba, and especially to Havana, on business. The island is notoriously dry, so far as oil production is concerned, one lonely well at Motemba yielding a little gasoline which, according to the statement of the owners, doesn't even pay the interest on the investment. But Cubans should worry about the arid conditions of their sub-surface strata. As long as the surface formations are as well saturated as they appear at present, the islanders will murmur very few complaints.

Before some shrewd individual penetrates our shallow reasoning and guesses the truth, let us state that this writer never had any business whatever in Cuba except the business of enjoying the tropical beauty and foreign atmosphere. Late this fall, he found that two weeks of idleness on full pay which had accumulated during the year had begun to present a problem. A vacation in Colorado requires more than half a month and besides that would have been a duplication of the previous summer. Most American cities are so much alike that no particular one not previously visited offered much in the way of excitement or novelty.

Picturesque Havana

A long-standing desire to visit New Orleans, the most picturesque city of the South, led to an investigation of time tables and railroad fares. It developed that a tourist can get from Tulsa to New Orleans in 26 hours for an approximate tax of $30. That seemed cheap and fast enough, and apparently other worlds might be conquered in the remaining time. One thing leads to another, of course, and the magic name of Havana somehow slipped in unawares. The prospect of a sea trip brought back mingled memories of the "Big Fuss," and nervous fingers thumbed the pages of steamship folders. It appeared that a man could leave Tulsa on Monday night about 6 o'clock and step off the boat in Havana, known as the "Center of the World," about Friday noon. He could then, within his allotted two weeks, devote five days to strolling down the Prado listening to the soft intonations of Spanish from the smartly dressed Cubans, or to delightful music under a dreamy tropical moon, or visiting the Tropical Gardens where free beer is dispensed by a generous distillery owner, or playing the races, the Casino and the Jai Alai games, a glorified kind of handball.

Perhaps I should have said that five "nights" can be devoted to such pleasureable pursuits, because Havana undoubtedly appears to best advantage at night. Not that the city lacks architectural beauty or cleanliness, for the fine marble and granite structures two or three stories in height, which decorate the Prado and the Malecon Boulevard, are objects of admiration. The profusion of wrought iron balcony and window grille work and the ornamentation of the public buildings arrests attention of any traveler. The Cubans believe in monuments, too, and have not only ecected them in honor of their own public spirited citizens but have constructed a beautiful marble shaft in memoriam to the survivors of the Maine.

But the nights! Buildings that stand out in brilliant beauty under the tropical sun, are forgotten as the soft southern moon swings up over the royal palms, which wave gently in the cool salt zephyrs wafting in from the Gulf of Mexico.

What Strikes Americans

The writer's visit to this near-paradise was just a little premature. The open season on tourists begins Thanksgiving Day, signalized by the elevation of hotel rates and other tourist necessities. It is then that the Casino bursts into bloom, offering to the tourist a greater variety of methods to distribute his American coins than any other Cuban institution. It is then that the race track comes into its own, where Ring Lardner once learned how to speak Spanish by repeating "Your horseo finisho lasto."

But the Cuban lottery was running strong as usual and offering its customary chance of winning $100,000 on a $30 ticket or a proportionate amount on smaller denominations, the chance being about one in a million or something like that. The Supreme Court of the United States should reverse its rigid decision in regard to this lottery so that American tourists could at least bring the tickets home for souvenirs.

Another Cuban institution that was doing business as usual while the writer was there, was the Jai Alai game, which, being pronounced, is something lige "High Lie." During the tourist season, this game is played by men, so I was told, but at this time it was a woman's pastime. It is played on a large handball court with smooth walls on three sides, and the girls used a kind of a tennis racquet. The chief object of any game in Cuba seems to be the betting that can be done on it, and if the Jai Alai game as played by men allows any more betting than the one we were priviliged to witness, our sluggish imagination cannot picture it. The gamblers (respectful synonym for spectators) not only go wild but they seem to go crazy. Red-capped attendants dash frantically up and down in front of the stands with books to accelerate and facilitate the betting but they are unequal to the task. Dark-skinned enthusiasts rise in their seats and shriek some gibberish in Spanish coupled with the name of Angela or Aurora or Encarna, or whatever the name of their favorite may be. Each girl on the court has her name on a huge score-board at the end of the building, and betting is done on her individually. The odds are figured down to a fine point and change every minute. When the contest waxes warm and the score tightens, the players rest a bit so the gamblers and bookies can catch up with them.

Little English Spoken

One of the surprises in Havana is the comparatively small amount of English spoken. That doesn't mean "English as she is spoke," or the "King's English," either, but just any old kind of English or American. Lord knows there are many Cubans who proudly announce that they speak perfect English although you may have to get an interpreter to find out what they are getting at.

Havana is removed from the United States of America by a narrow strip of water only 90 miles in width and yet it is as distinctly foreign in customs and character and language as Buenos Aires. It is a city of friendly people, combining Old World beauty and charm with New World cleanliness and sanitation.

Perhaps a word should be said about the beauty of Havana's women, but space prohibits an adequate treatise on that subject.

If the Cubans care not for our language, they do not let that influence their feeling toward our coins and currency. You may hand a Cuban cafe proprietor a dollar bill, for instance, to pay for a 15-cent drink of buttermilk or something (understand this is a hypothetical case) and get back 85 cents in American coins. That is possible. The probability is, however, that you will receive a mixture of Cuban and real money so you will have to count for half an hour and examine the coins closely to find out whether it is right or not. The insidious thing about Cuban money is that the 20-cent piece looks like the American quarter and is just a sixteenth of an inch smaller in diameter, while a native grown penny bears the same relation to a real dime. Whether this was a case of malice aforethought or not you can judge for yourself.

Reckless But Safe Traffic

The traffic system in Havana is a source of amazement to travelers from this law-ridden land who are accustomed to stop signals, traffic cops who bellow and gesticulate wildly, and other irritations which make motoring in the United States a nightmare. The first instinct of a tourist beholding the corner where Obispo Street, for instance, meets Central Park, is to shut his eyes and listen for the crash. But the crash doesn't materialize. He opens his startled optics and groans as a taxi driver threatens to run down the dignified traffic officer who is resting in the middle of the street with one hand on the "stop" sign and another on his horse. That seems to be the only use he has for a horse but there it is, as big as life, explaining what becomes of all the horses that disappear from the United States. Anyway, the cop and the horse both escape death miraculously by a hair's breath but don't even seem to have been aware of their danger. The "fotinga" in which you are riding then dashes up the left side of the street, shoots in front of another officer, cuts a corner and darts into a narrow one-way street, coming gently to rest barely two inches from the rear of the car ahead. You look back anxiously to see how many cops are trailing you and find that if they wanted to do anything they wouldn't have a chance because the street behind you is already filled with half a dozen Chevvies and Flivvers.

Havana is a city of more than half a million souls; it seems to have practically no traffic regulations, and yet accidents are given front page prominence in the local newspapers when they occur. The riddle is a hot one. But whisper it gently, the writer never saw a woman driver during his brief stay on the island! Furthermore, what may be more to the point, he never beheld an inebriated gentleman. Not only that, but he failed to see a single plain drunk.

For the benefit of American cities, it might be well to pass a few laws similar to those the Cubans have. Taxi drivers can't charge more than 20 cents for two people in the first zone, which includes the docks, Central Park, the principal hotels and most of the downtown part of the city. They get 10 cents extra for every piece of baggage, of course, and there is no law prohibiting them from accepting whatever you give them for their services. Consequently, they don't recite the law to you but merely extend the palm to have it greased. They are carefully ignorant of English.

These "fotingas" or taxis are the most restless objects in Havana. They have no headquarters but drive up and down the streets and boulevards, sometimes three or four in a row, and all you have to do is raise a finger to stop one. Your next difficulty is to convince the driver that you want to go some place and don't care to drive around by the hour.

No Filling Stations

These cars are hired by the drivers for $3 a day. If they take in more money than that they realize a profit. If not, they are sunk. This practice has led to some evils in the island, notably dealing with lubricating oil. Naturally, the driver doesn't care what becomes of the car after he is through with it so he buys the cheapest grade of lub oil he can find. Naturally, also, demand has brought a supply.

Like the snakes in Ireland, there are no filling stations in Havana such as we have in the United States. There are several reasons for this. In the first place, up to last July, the West India Oil & Refining Co. of Cuba enjoyed a monopoly due to its refinery already mentioned. An import duty on the products of other firms created a differential of 14 cents and under this monopoly, gasoline was sold in garages and at curb pumps, no aesthetic appeal to the consumer being necessary.

Along in July, however, the import duty was reduced to one-tenth of a cent and a consumption tax of 10 cents was clamped on all firms alike, so other companies now have a chance to offer stiff competition. Property is so high in Havana, however, and economic conditions have been so adverse since the middle of the summer that no change has been made in marketing methods in the city. It seems a pity, though, for curb pumps to be allowed along such boulevards as the Prado, Malecon and others.

But the Cubans are practical and do not hesitate to capitalize on most anything out of which revenue can be derived. They allow beer ads on the light

(Continued on Page 180)

A trip to Havana

"The Center of the World"

The story in pictures of an ideal vacation for the Mid-Continent oil man

Left: Pulling away from the dock at New Orleans. ~

Below: A Sinclair tanker in Havana harbor

A camera-study of Havana's most picturesque elements—Morro Castle lighthouse, with the President's palace and the heart of the city in the background. The obstruction in the foreground is the Oil and Gas Journal staff writer. ~~

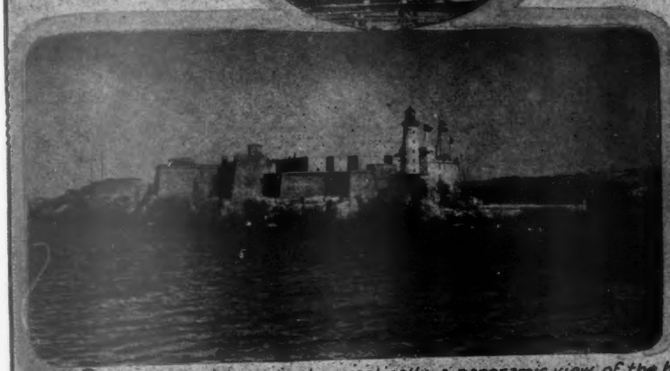
Below: One of the most beautiful spots on Havana's water front, yet seldom seen by tourists ~ Offices of the West India Oil Ref. Co. of Cuba. (Standard of N.J.)

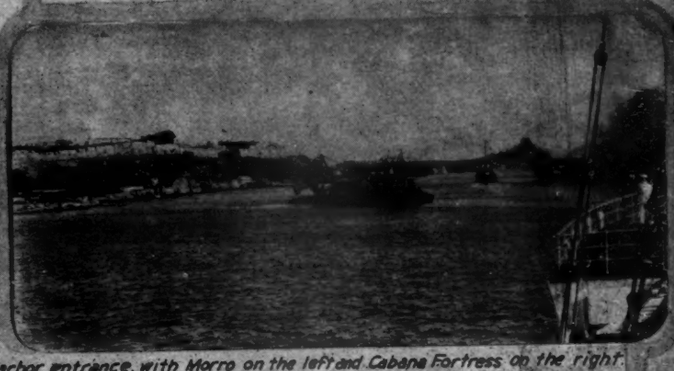
Across Havana's beautiful harbor is the Standard of New Jersey's 40,000-bbl. refinery

All Staff photos

Statue of Marti, best liked Cuban president, in Central Park. National Theater in the background

A closer view of the West India office

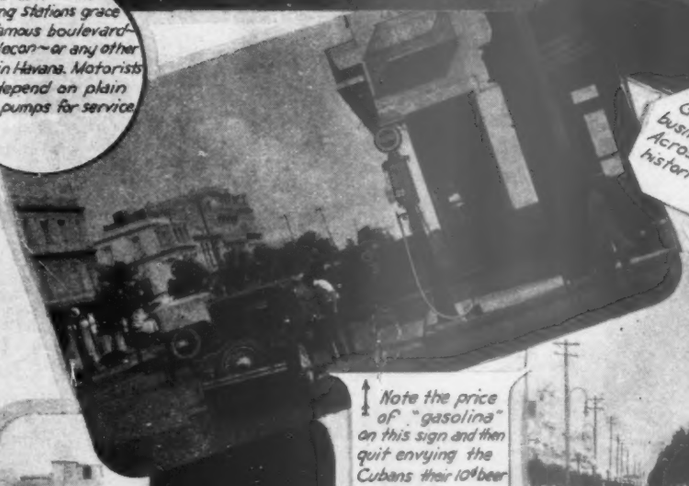




These two pictures make practically a panoramic view of the harbor entrance, with Morro on the left and Cabana Fortress on the right

So this is a Havana filling station

No drive-in filling stations grace this famous boulevard—the Malecon—or any other street in Havana. Motorists must depend on plain curb pumps for service



Getting ready for the day's business along the Malecon. Across the harbor entrance stands historic old Morro Castle.

Note the price of "gasolina" on this sign and then quit envying the Cubans their 10¢ beer which won't run a Chevvy or a Flivver very far. This curb pump is on the Prado and nobody seems to object seriously to the hose stretched across the walk.

Looking down the Prado, the "Main Street" of Havana

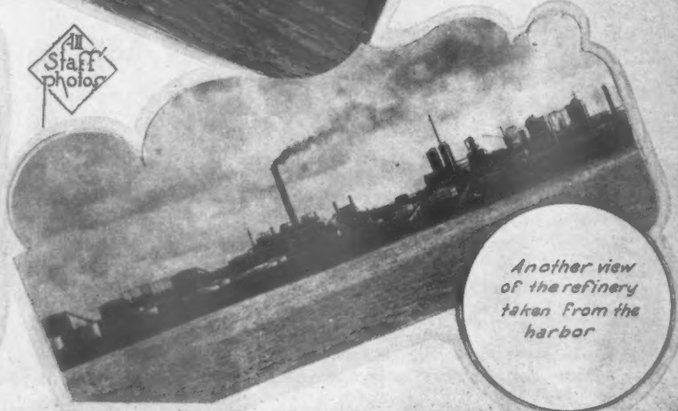
One of the prettiest harbor approaches in the world, travelers say. A view of the Malecon from the sea.

A typical Havana street scene

Another "filling station" on the Malecon, looking toward the Maine Monument

Part of Cuba's only oil refinery, showing three cracking coils, and other up-to-date equipment

All Staff photos



Another view of the refinery taken from the harbor

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PAUL ARBON & COMPANY, Tulsa

ARBON-VICKERS WELDLESS JARS

Economic Fuel Burning in Refining

Not Alone a Matter of Instruments or Expensive Equipment Which May Be Useless Without Intelligent Cooperation

By Philip A. Moore
Junior Member of the American Institute of Chemical Engineers

Since the earliest times in recorded history man has found that heat was a necessary aid in his conquest of nature and his progress might be measured by his ability to use heat effectively to benefit himself and his neighbors. Practically all manufactured articles on the market today owe their being to the use of heat, or power derived from heat, at some stage of their life history.

All of us will agree that the petroleum refining industry requires large quantities of heat derived from fuel to carry on the manufacture of marketable products from the raw material. As fuel must be paid for either in cash, or its equivalent, a decrease of the fuel oil available for sale, even a small saving in the fuel required to accomplish a certain operation where heat is used is a direct saving in manufacturing cost.

Before starting to discuss fuel saving a definition of combustion in the limited sense that will be made use of in this article should be stated. The term combustion is used in this way: the chemical union of oxygen contained in air with the combustible elements of the fuel being burned, heat is produced as a result of the chemical union of oxygen contained in air with the combustible elements of the fuel being burned, heat is produced as a result of the chemical reactions. The principal elements in a commercial fuel be it coal, oil or gas, are carbon, hydrogen and sulphur, either free or chemically combined with each other. Sulphur is usually considered an impurity in any fuel although heat is liberated by its combustion. An to further limit the term combustion for manufacturing purposes requiring heat; combustion should take place rapidly, all of the heat being generated in a reasonable space of time. Heat is generated when coal weathers, that is partially oxidized on exposure to air, the chemical reaction takes place so slowly, however, that no use can be made of the heat so produced. Large coal piles are often set on fire due to this weathering action.

Definitions

Now, like all other chemical reactions, the oxidation or burning of the combustible elements of a fuel should be quantitatively studied and the reaction controlled by suitable means to secure the maximum economic results. The family budget system depends upon units of measure, as for example, dollars and cents, to enable a correct concept of values to be arrived at. Just so in studying the combustion of fuels a measure of value should be available for use. In the United States and Great Britain the unit of measure in engineering literature is the British thermal unit expressed in abbreviated form as B.t.u. The B.t.u. is defined as that quantity of heat which will raise one pound of water one degree Fahrenheit. The exact scientific definition specifies that the initial temperature of the pound of water be 63 degrees Fahrenheit, however the variation in the value of the B.t.u. for a range of water temperatures from 32 degrees to 200 degrees Fahrenheit is so very small that the variation can be neglected in commercial work.

The problem in hand then, is this: if a fuel oil is to be burned which contains 19,000 B.t.u. per pound of oil, as shown by laboratory test, the oil having market value of 1 cent a pound, the best results from a fuel saving viewpoint are secured when as many B.t.u. of the 19,000 B.t.u. theoretically available are absorbed by the water or oil that is to be heated. Every B.t.u. not absorbed by the water or oil represents a loss of one nineteen-thousandth of a cent; some loss is unavoidable in commercial practice.

To reduce fuel losses to a minimum in commercial practice, the combustion of the fuel oil must be carefully controlled. How can economy be secured with any fuel? By furnishing just the correct quantity of air, whose oxygen content is necessary for combustion, and mixing this air so well with the fuel that all the combustible portions are completely burned. Either excess or deficiency in the quantity of air supplied to burn the fuel used, coal, wood, oil or gas, will not give the economic results that are desired. A greater quantity of any fuel must be burned with either excess or deficiency of air to complete the heating operation being carried on, than would be the case with the correct quantity of air. In case insufficient air is furnished for the combustion of the fuel a part of the combustible matter will pass up the stack unburned. If an excess quantity of air is used for the combustion of the fuel the furnace in which the fuel is being burned, will be lowered in temperature as the excess air supplied to the furnace above that required for complete combustion, must be heated from the air supply temperature to the temperature of the stack gases, and the heat content of the quantity of air in excess of that required for complete combustion is a direct loss, unless some form of flue gas economizer is used and even with this equipment not all of the heat lost, due to the use of excess air in the furnace, can be recovered.

Air to Fuel Ratio

Practical results impose certain modifications be made in theoretical procedure. It is impossible to keep the air to fuel ratio exactly correct at all times, the high temperature obtained is apt to be very destructive to furnace refractories, and the difficulties experienced in trying to secure perfect mixing of the air and fuel together and at the right time and in the right quantities, all make perfect combustion a commercial impossibility. In commercial operations where complete combustion of a fuel is desired an excess quantity of air must be supplied to the fuel to secure complete combustion.

Good furnace design, efficient fuel firing devices, and careful firing methods will limit the quantity of excess air needed to secure complete combustion of the fuel and practice can be made to approach theory quite closely. Burning any fuel then with the nearest practical approach to the exact quantity of air required to complete combustion is the statement of the problem, "burning fuel economically." The need of clean heating surfaces to absorb the heat generated by combustion of the fuel, will be mentioned shortly.

The ordinary fuels, one might say universal as regards petroleum refining practice, are coal, oil and gas; either natural or residue gases derived from the distillation and storage of petroleum products. The convenience and cost of handling any fuel should be taken into account as well as the useful quantity of heat that can be obtained from the fuel in question for a unit amount of money. The heat value, B.t.u. per pound of solid and liquid fuels, and the B.t.u. per foot of gases are either measured by a calorimeter, or as is sometimes done from a chemical analysis of the fuel. In the hands of a competent chemist or engineer these methods are excellent, but the calorimeter gives strictly theoretical results on the heating value of a fuel and these results cannot be duplicated in practice. The heating value of fuel obtained from laboratory tests or calculations give the total heat contained in one pound or one cubic foot of fuel and there results need interpretation before they are applied to commercial practice. For example, a calorimeter test may show a certain coal contains 9,500 B.t.u. per pound; but when this particular coal is fired under a boiler or still on a natural draft grate it is found that clinkering is so bad that the coal can not be economically used even though the price per ton is much lower than that of the better grades of coal. The composition of coal varies a great deal more than most oil or gas fuels and therefore needs to be tried under actual working conditions even more than oil or gas fuels.

Physical Characteristics

The physical characteristics of fuel oil requires study before the best combustion results can be obtained. Some fuel oil must be heated to reduce its viscosity prior to firing; salt and other dirt in the oil may cause trouble by lodging on the heating surface of boilers or stills, and clogging the oil lines and burners. Even nautral gas, unless purified, often contains salt water, sand and other solid impurities which will in time damage valves and stop up the small orifices used in some types of gas burners. For the reasons mentioned above any particular fuel should be studied if possible in practice with the several types of fuel firing equipment proposed, and that equipment purchased that gives the best results not alone combustion efficiency, but first cost, maintenance, and useful life should be considered. A calorimeter test only tells part of the story but such laboratory tests are a help when the refiner of petroleum desires to cut down his fuel bill. So much literature is available on the chemical and physical properties of different fuels that these properties will not be discussed. The man interested in securing the utmost fuel economy should make a study of the fuel or fuels he proposes to use both by reading good books on the subject and by practical tests made under working conditions in his plant.

Air Supply and Regulation

All well informed persons will agree that air, to furnish the necessary oxygen to burn the combustibles in the fuel, must be furnished in somewhat near the correct quantity before combustion can take place. Any motorist will certify to the fact that a very lean or a very rich gasoline mixture will not explode in the cylinder of a gasoline engine. Either smoke stacks or fans, and sometimes both, are used to furnish an air supply for the combustion of the fuel used in petroleum refining operations. Stacks furnish a supply of air to the fuel by forming a low pressure area in the flues and furnaces into which the higher atmospheric pressure forces the air supply. The action of the stack is spoken of as natural draft. Now natural draft depends upon the fact that the heated flue gases are lighter in weight than the surrounding atmospheric air.

If it were possible for the flue gases to be cooled down to atmospheric temperature before they were delivered to the stack then the highest stack would prove a useless investment. The taller the stack the better the draft, which means that a greater quantity of air can be forced into the furnace in a unit period of time, other conditions such as flue gas temperatures, barometric pressure and stack diameter remaining the same.

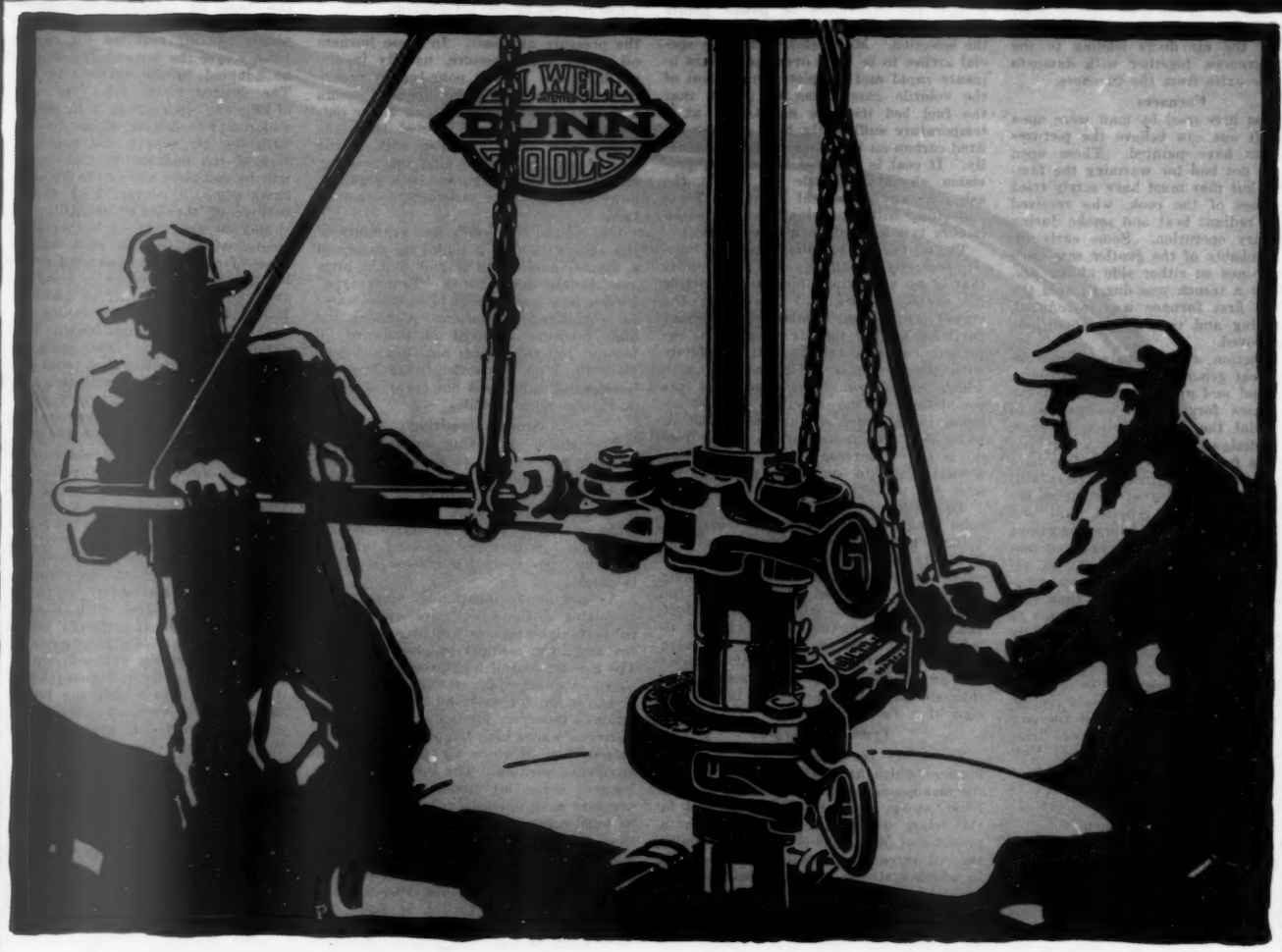
Local conditions sometimes make necessary the use of power driven fans to furnish the air supply for burning the fuel. A careful study should be made of the fuel and operating conditions before the source of air supply is decided on for a new installation; natural draft is used to furnish the air supply to the boiler and still furnaces in the majority of petroleum refineries.

After the means of furnishing the air supply to the different furnaces is decided on, a means of changing the quantity of air supply per unit of time to any furnace becomes imperative if economical combustion conditions are desired. The proper device to regulate the air supply when natural draft is used is a good damper, placed just before the entrance to the common flue in case several stills or boilers are to be operated from the same stack. A damper in this position will enable the firemen to regulate the air supply to any individual furnace without affecting the other furnaces connected to the same stack. The air supply to a furnace should not be regulated by the ash pit door; this method of regulating the air supply to a furnace is fundamentally wrong.

Requirements of Good Damper

The requirements of a good damper are: Ability to stand the temperatures encountered without injury, and, a point that is often overlooked in damper design, the damper should be easy to operate. The damper control should be brought to the front of the still or boiler so that any change in the fire caused by the adjustment of the damper can be seen easily. A damper control so located that a trip to the front of the still or boiler must be made after the damper has been adjusted to inspect the fire, means that that particular damper will seldom be changed. Make the damper as handy to operate as the oil valve on a fuel oil burner. A good mental picture of the action of a damper in regulating the air supply to a furnace can be secured by thinking of a water tank elevated sufficiently high to insure a good water pressure. A pipe is now connected to this water tank, the pipe ending at a lower level than the tank. On the end of this pipe imagine a water turbine enclosed in a case. To regulate the speed of the turbine a valve is placed on the water exit side of the turbine. The valve mentioned above functions the same as the damper on a furnace. Full water pressure is carried on the turbine when the exit control valve is closed, in like manner full atmospheric pressure is carried on a furnace when the damper is closed. Well-made and properly placed dampers are essential pieces of equipment in any installation of boilers or stills using natural draft, if fuel is to be conserved.

The quantity of air furnished to a furnace by a fan can be regulated by changing the speed of the fan in case each furnace is equipped with individual fans. The fans used to supply air to furnaces are classified under two heads, induced draft fans and forced draft fans. Induced draft fans lower the pressure in the furnace below that of the atmosphere, the draft conditions are the same as those produced by the action of a stack. Forced draft fans, as their name indicates, force or blow air into the furnace at a pressure higher than that of the atmosphere. Care should be taken with forced draft to prevent a positive pressure from being carried in the furnace itself. If this precaution is not taken rapid failure of brickwork results. In case several furnaces are to be served by one fan, then individual dampers will be necessary to



SPEED and SAFETY STANDARDIZED

Pride of accomplishment provides one of the greatest thrills that human intelligence may experience. There is no richer reward for labor well performed than the knowledge that it has proved to be a genuine service to humanity.

As the American Petroleum Institute sits in conference at this annual meeting, the foundation for new and greater achievement is being laid. Standardization throughout the Petroleum Industry opens new and more direct avenues to greater accomplishment in actual service, insuring the maximum of benefit to all the world. And the men thus engaged will, without doubt, be rewarded more in the knowledge and pride of achievement and in gratitude than through the accumulation of worldly wealth in return for their efforts.

For nearly a decade we have striven toward higher attainment in oil field practice. Concentrating upon few products instead of upon many, we have endeavored to develop Dunn Tools to the highest state of perfection humanly possible, confident in the knowledge that earnest and intensive effort confined within reasonable bounds would result in greater accomplishment, and consequently, greater service to the industry.

Today, Dunn Patented Oil Well Tools, though limited in number, are known and used throughout the entire petroleum world. To oil men everywhere, the name "DUNN" carries a special significance. In these highly specialized tools, maximum speed has been augmented by positive safety in operation to a degree that has made possible greater achievements in field practice and a broader, more worthy service through the petroleum industry, to the world at large.

Dunn Patented Oil Well Tools consist of: Casing, Tubing and Rotary Tongs; Casing, Tubing and Rotary Elevators; Sucker-Rod Elevators; Safety Spring Hooks; Tubing Catchers; and Floor-Circle Braces. Folders containing complete descriptions, sizes, prices and weights will be furnished on request.

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adjust the air supply to suit any particular furnace. Induced draft fans would require dampers in the flues; forced draft fans would require that the dampers be placed in the air ducts leading to the several furnaces, together with dampers in the flue exits from the furnaces.

Furnaces

The first fires used by man were open bonfires, if one can believe the pictures our artists have painted. These open fires were not bad for warming the family circle, but they must have sorely tried the patience of the cook, who received plenty of radiant heat and smoke during the culinary operation. Some early inventor, probably of the gentler sex, tried putting stones on either side of the fire, or perhaps a trench was dug to hold the fire. The first furnace was introduced, both cooking and combustion conditions were improved.

The function of a furnace is to confine the heat generated, to assist in mixing the fuel and air, and to conduct the heated gases formed by combustion to the material that it is desired to heat. Furnace design and construction is important, as furnaces not designed to handle the fuel that is burned in them will usually render the best of fuel firing devices inefficient. In general, still and boiler furnaces for oil refinery conditions should be built of the best grades of material available. The statement in regard to material for furnace construction needs no other explanation than that of the continuous heavy duty service to which still and boiler furnaces are usually subjected. The fact is too often overlooked in refinery furnace design that the best economic results can not be obtained with a fuel unless the furnace is designed and constructed to handle the particular fuel used, and to fit the fuel firing equipment installed in the furnace. Furnace repairs should not be neglected; even the best of furnaces must be kept in shape if fuel is to be saved.

Fuel Firing Equipment

Fuel firing equipment has been mentioned above under furnaces. A few facts about these devices will now be mentioned. Grates are required to support coal or solid fuel and allow a free flow of air to the fuel bed; unless powdered coal is fired. Fuel oil must be atomized so that air can be intimately mixed with the fine particles. Gas fuel requires that at least part of the air for combustion be mixed with the gas stream prior to the release of the gas into the furnace if rapid and complete combustion is to be obtained.

Some refineries use hand firing for introducing coal into the furnace; others have done away with this method and are using automatic stokers for firing coal. No one type of grate or stoker is successful in handling all classes of coal. In choosing a stoker for installation under a still the experience of power plants using stokers will prove helpful in making the selection. Many stokers require special arches to be built over the stokers to insure rapid and complete combustion of the volatile gases, also to insure that the fuel bed itself is maintained at a temperature sufficiently high so that the fixed carbon on the stoker will burn readily. If coal is the fuel to be used, provision should be made to handle the ashes in an economical manner. Tests and study will determine the most satisfactory type of coal burning equipment.

The oil burner, so called, does not burn oil, correctly speaking. Its function is that of an atomizing apparatus to divide the stream of fuel oil flowing to the burner into a great number of very small particles so that the air supplied to the furnace can mix rapidly and completely with the fine mist. The velocity with which combustion takes place and the completion of the reaction largely depends in this case on the size of the oil particles. The object of atomizing fuel oil is to so increase the surface of say a cubic inch to such size that the oil mist will partake of the nature of a gas.

To further illustrate the point, take a solid square block of material measuring 1 inch on each side; the surface will be 6 square inches; divide the block into cubes measuring .001 of an inch along a side; the combined surface of all the small cubes will be 6,000 square inches. Highly heated surfaces of brickwork to volatilize at least a part of the more volatile constituents of the oil particles are an auxiliary aid to oil combustion that should not be neglected in the design of a fuel oil furnace.

Types of Burners

There are three general types of oil burners which are classified according to the means employed in atomizing the oil. First, steam atomizers: Oil burners in this class use steam, usually under a pressure of 50 pounds or more, to atomize the oil stream. Second, air atomizers, in which a stream of air is used in place of steam for atomizing purposes. One type of air-operated burner is designed to operate on low pressure air furnished by a fan; the other type requires the use of high-pressure air furnished by a compressor. In fact, most, if not all, steam-operated oil burners will function satisfactorily with high-pressure air in place of steam as the atomizing agent. To illustrate the function of steam or air in atomizing fuel oil, depart a moment from the discussion of burners and recall the Chinese laundryman who was in the habit of sprinkling the clean clothes with a little can using a stream of air from his lungs to atomize the water. The Boards of Health stopped the use of the lungs as an air compressor so the past tense is used in the illustration.

The third general class of oil burners is the pressure atomizer. In these burners oil under high pressure, usually in the neighborhood of 200 pounds per square inch, is delivered into the furnace through a special nozzle equipped with a fine outlet tip. The oil is projected from the nozzle in a very fine mist without the use of air or steam; high oil pressure and good nozzle design are both required, however, to produce satisfactory atomization.

One of the best every day examples of the atomization of a liquid by means of a special nozzle and a high liquid pressure is the action of a "Boston type" garden hose nozzle used to atomize water for sprinkling vegetation. Although the high pressure required in pressure oil burner practice does not have to be maintained on the water, some pressure is essential to insure a fine spray of water and not a mere dribble.

Steam Atomizing

The steam atomizing burner is the favorite type of fuel oil burner for firing boilers and stills in the petroleum refinery. The principal features of this class of burner which make it popular are, wide operating range, ability to handle dirty oil, low first cost, ease of installation, and low cost of operation if steam is cheap.

As previously mentioned, most steam atomizing burners will fire oil successfully if high-pressure air be supplied as the atomizing medium in place of steam. The greater cost of high-pressure air compared to steam eliminates the use of high-pressure air for most oil-burning installations; however, for some metallurgical purposes where high temperatures are required, high-pressure air is used as the atomizing medium. The low-pressure air burners using air under a few ounces pressure have not as a rule been designed to handle heavy oils in the large quantities demanded in the refinery. These burners, however, are well adapted for domestic heating work and small furnaces, provided oil of low viscosity and low flash point is used. At least two manufacturers of this class of oil burner have made notable progress in the adaption of their low pressure air atomizer burners to heavy duty service with oils of high viscosity; high first cost and delicate parts which are not able to stand rough service, are features that usually limit the field of these burners to operations outside the refinery field.

Steam and Air Operated

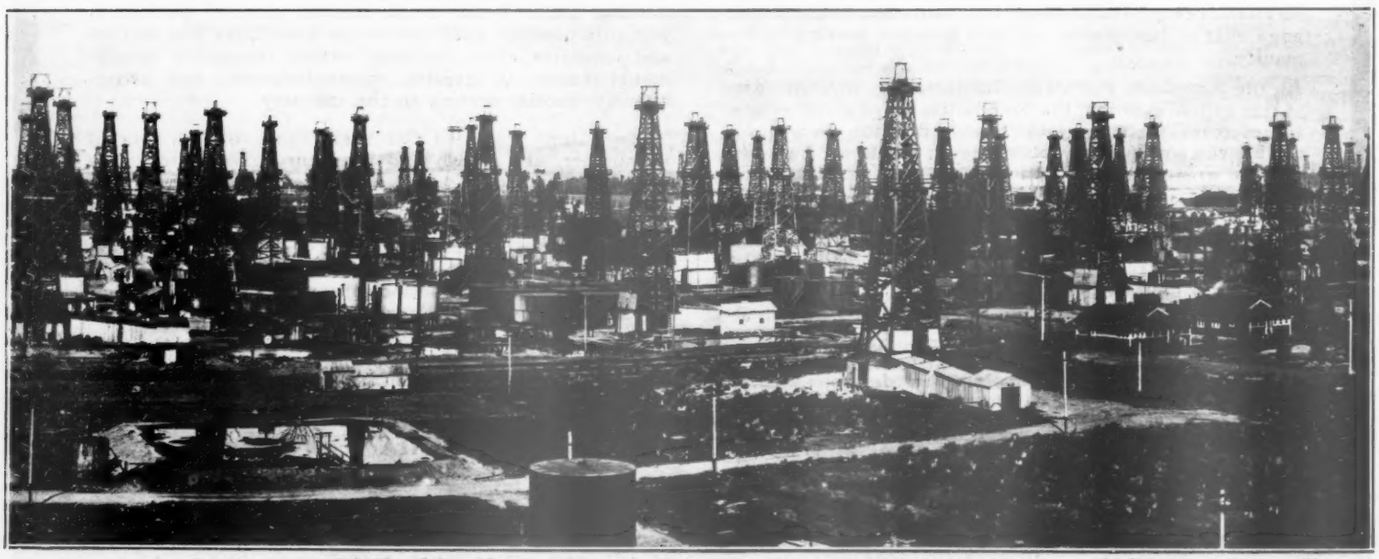
Steam and air operated oil burners can be purchased in several different styles and capacities. Wide flames, long torch-like flames, or cone-shaped flames can be secured by the selection of the proper style of burner. The shape of the flame as determined by the burner is also influenced by the method of supplying the air required for combustion. In any case the form of the flame should be adapted to the furnace in question. The desired result from the viewpoint of efficient combustion, is to secure early and complete mixing of the fuel oil mist with the air supply and rapid combustion of the mixture so that combustion will be complete before the highly heated gases come in contact with the heating surface of the boiler or still. The air supply to any type of burner should be conducted to the oil mist so that no lanes of air will be conducted around the oil flame and give, as a result of the short circuit, excess air in the flue gases. Excess air entering from faulty air passages can not be cut down much by damper regulation. The same care in furnace construction, of course, holds equally true for both coal and gas burning furnaces; air and fuel should be brought into intimate contact, no air being permitted to bypass the fire.

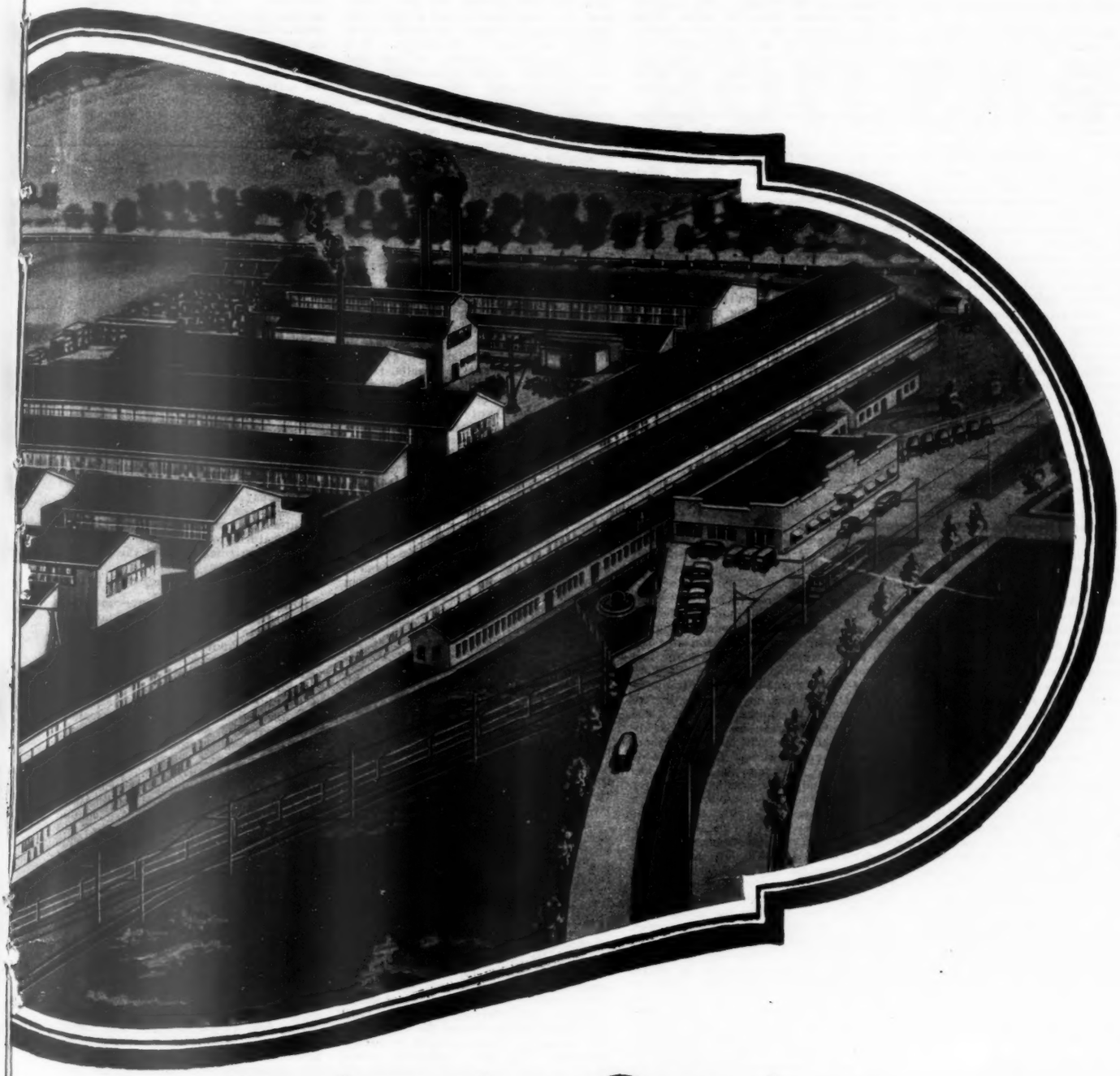
Claims for a certain make of burner are often advanced showing the fuel saving that can be obtained with this particular burner, and, to back up the economy claim, test data are shown the prospective customer. The majority of this test data can not be impugned, at least, not until more facts are known than appear on the test sheet. Impartial test data seem to agree with theory, that two oil burners of different makes will show the same efficiency under actual tests, provided the furnace construction is correct for both burners; and that the only way in which one burner can show greater economy than another is in the quantity of steam required to atomize a unit quantity of fuel oil, both burners must, of course, atomize the fuel sufficiently to allow good air and fuel mixture. No first-class steam burners fail to atomize the oil when clean and adjusted, trouble is, however, encountered when carbon forms on the burner tip, part of the oil often being ejected from the dirty burner in a solid stream.

Quantity of Steam Required

The quantity of steam required to atomize a given quantity of oil does vary with the different burners. It would be very convenient if the steam atomizing burner manufacturers would standardize the method of expressing the steam consumption of their burners, stating the number of pounds of steam required to atomize 100 pounds of oil of given characteristics, also capacity ratings of the different models of burners in pounds of oil atomized per hour rather than rating the burners on the size of

VIEW OF PORTION OF THE SANTA FE SPRINGS FIELD





ending the American Petroleum
ally invited to visit the plant
, located at Torrance, Calif.

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the boiler that any particular model will handle.

Due to expensive auxiliary equipment and greater operating cost very few, if any, refineries have adopted air atomizing fuel oil burners for firing oil under stills and boilers, preferring the less complicated steam atomizing system. In other fields the air atomizing burner is universally used and very good results can be obtained in a factory installation, say, where no high pressure steam is available or maximum furnace temperatures are required; no such limitations are placed on the petroleum refiner and the writer has never visited a refinery that used air to fire oil under large units of refinery equipment.

The pressure atomizing type of oil burners are used by the United States Navy on oil burning vessels and by the oil burning merchant marine operating on salt water. This type of burner is also slowly displacing the steam atomizer burner in some of the large power plants recently erected where oil is burned for boiler fuel. The pressure type of atomizing oil burner, although the first cost of the equipment is high, has a low operating cost, a feature appealing to the management. Other characteristics limit the field of this system for satisfactory operation; due to the small orifice that is employed oil for pressure atomizing must be relatively free from sediment and tarry matter that would stop up the burner; refiners operating pressure stills often burn the residuum from these stills for fuel, this material can be handled with a steam burner, but hardly with a burner which depends on the discharge of oil through a hole 1/25 inch in diameter.

Pressure Atomizer's Range

The other feature of the pressure atomizer oil burner that is more serious than the clean oil requirement, the operating range of this class of burner is fixed within much narrower limits than the other types; for example, if a higher fire is required either additional burners are inserted or the burner is removed from the furnace front and another burner having a larger oil capacity inserted. Please do not take this to mean that the burner has no range of adjustment; the range is much smaller than the steam atomizer.

The future progress of fuel oil burning will, in the writer's opinion, be along the line of a flexible pressure atomizing burner, working well on moderate pressures and reasonably clean oil and adapted to replace the steam burners now in use. To any one contemplating the installation of a pressure atomizing fuel oil system do not forget that an extra fire hazard will be created unless care is taken to use only the best grade of high pressure piping and fittings in putting in a high pressure oil system; also at times, at least, hot oil will flow through the lines and expansion must be taken care of by correct design of the piping system.

Function of Burner

The function of a gas burner is to mix more or less of the total air required for combustion with the gas which it is desired to burn and the burner proper usually servies to introduce the gas air mixture into the furnace. The majority of gas burners built for boiler firing do not introduce all of the air required for combustion in the gas mixture, but only a portion of it so that the additional air requirements are taken care of by adjusting the damper or fan as is done in fuel oil firing.

The majority of gas burners make use of the principle employed by Dr. Bunsen, the chemist, when he designed the laboratory gas burner that bears his name. The principle used by Bunsen is that when a gas under a higher than atmospheric pressure is released from a nozzle the velocity energy of the gas stream can, by suitable equipment, be made to draw in varying quantities of air; the gas and air mixture so formed in the body of the burner can then be burned with a blue flame without the formation of soot as is the usual case when gas is burned without previously mixing with air. The gas operated air injectors on the gas cook stove or radiant heater are good examples of the Bunsen effect.

Air for burning gas can, of course, be supplied by fans if desired, however, this should not be necessary in boiler or still installations using gas fuel, and should not be required for this class of industrial furnaces. Allowing gas in large quantities to escape into a furnace not mixed with air is not an economical way to burn gas. As with coal or oil firing devices the type of gas burner chosen should be one which is designed to work properly under the given conditions, a long flame burner may give good results in a large fire box and fail if put in a small fire box such as that under an oil field boiler.

Fuel Conservation

If a fuel conservation policy is decided on by the refinery management what is the first step? The cooperation of every man having anything to do with the fuel program, from the board of directors who pass on expenditures for equipment and repairs, and so on down the line to the fireman who handles the fuel. The fireman's interest can be gained by appreciation of his efforts by the foreman, by instruction in correct firing methods by some one in whom the fireman has confidence, and, if practical, a bonus for fuel saving, such bonus to be paid as a commission for fuel saving, and not as a present. Do not discount the knowledge and ability of the fireman; he can often render valuable aid by suggestions or by giving his side of the story as to why the steam pressure was low or the stills failed to run their quota.

A frank talk between the fireman and a man, be he foreman, engineer or other, who has studied combustion in a practical way often will be very helpful to both men in their endeavor to secure better combustion conditions. The remarkable boiler efficiencies shown in some of the tests run on boilers using powdered coal fuel were made possible only by having a knowledge of the combustion principles involved and having every man connected with the test do his best to secure the maximum efficiency.

Instruments As Aids

"Many a man has had to tell it to the judge" because he was running faster than the law allowed, but due to the lack of a speedometer and a poor personal estimate of speed, the traffic officer insisted on a trip to the station. If a fine was assessed, clearly the man lost both time and money without adequate reward for either.

For the same reason that a speedometer is placed on an automobile a few instruments are a great help in securing efficient combustion conditions and in keeping a part of the money spent for fuel in the bank.

Of first importance is knowledge of the quantity of air that is being used to burn the fuel. An Orsat gas apparatus costing not more than $50 will enable any intelligent man after a little practice to determine the percentages of carbon dioxide, oxygen and carbon-monoxide present in a sample of flue gas and these percentages will give information on the combustion results that are being obtained without a weight of the fuel being known or involved calculations, if one of the charts available for the purpose is used for comparing results. (Note, the Calorizing Co., Pittsburgh, Pa., have published a series of such charts in one of their catalogs.)

Carbon, the principal constituent of all commercial fuels, when completely burned forms a new compound with oxygen, carbon dioxide, a heavy colorless gas whose chemical formula is written $C O_2$. If the percentage of carbon dioxide in the flue gas is low for the fuel which is being used and in the absence of large amounts of carbon monoxide, excess air is flowing through the furnace and the percentage of oxygen as shown by analysis will be high if a check is desired on the excess air present as shown by the carbon dioxide percentages. It is suggested that, if an Orsat apparatus is purchased, the instrument be fitted for the analysis of carbon dioxide, carbon monoxide and oxygen so that complete analyses can be made if required although most frequent use will be made of the carbon dioxide parts. One pound of carbon when completely burned liberates 14,500 B.t.u. and, as stated above, carbon dioxide is formed. In case, however, less air is furnished to a pound of carbon than that required for the formation of carbon dioxide, another compound, carbon monoxide, will be present in amounts depending on furnace conditions. Due to poor mixing or slow combustion carbon monoxide is often present in flue gases containing oxygen in relatively large quantities.

Loss of B.t.u.s

No matter what the cause, for boiler and still operation no great percentage of carbon monoxide should be present in the gases for this reason, when one pound of carbon burns to carbon monoxide instead of carbon dioxide only 4,350 B.t.u. are liberated as a result of the chemical reaction, the difference between 14,500 and 4,350, 10,150 being the B.t.u. lost per pound of carbon burned to carbon monoxide. The Orsat apparatus is used then for the purpose of enabling the operator to correct faulty firing methods and to find out if the correct quantities of air are supplied to the furnace.

Now the handy Orsat takes some skill and quite a little time to determine the carbon dioxide percentage in the flue gases. To obviate the disadvantages of an instrument requiring the services of an operator several types of automatic machines have been built and placed on the market to show and usually record the percentages of carbon dioxide in the flue gases, a fresh sample of flue gas being analyzed for its carbon dioxide content every few minutes or continuously if the machine is of the constant flow type. Unfortunately carbon dioxide recorders are costly and rather temperamental as instruments go, and their full value cannot be realized unless adequate care is given them. Many of the popular recorders are in principle automatic Orsats in which the manipulations are carried out by machinery instead of hand operation. In either the hand operated or automatic Orsat caustic potash in solution or granular form in some automatic instruments serves to absorb the carbon dioxide present in the flue gases being analyzed. Liquid solutions of caustic potash are not pleasant to handle and the mechanism of the automatic Orsat type of recorders is of necessity complicated. Recently a new type of carbon dioxide indicator and recorder has been placed on the market; this instrument operates on an entirely different principle and does not require the use of chemicals, being operated electrically in a somewhat similar manner to an electric resistance thermometer. This type of automatic carbon dioxide recorder has many features to recommend it and will be a serious competitor of the chemical type recorders.

Draft Gauges

Draft gauges used in connection with periodical hand Orsat flue gas analyses are a help to the fireman; a knowledge of the pressure above or below atmosphere that is being carried in the furnace, together with a previously established relationship between carbon dioxide content of the flue gas and the fuel burned, enable the fireman to secure reasonably efficient results without the use of the more expensive recorder which many of the smaller power plants and refineries do not feel they can afford.

The pyrometer or flue gas thermometer are also of assistance to the fireman in securing efficient firing and are coming into use particularly on cracking still furnaces, economizers and boilers. Flue gas temperatures are useful in several ways, excess air raises the flue gas temperature as does broken baffle work and dirty heating surfaces, although combustion efficiency as shown by a flue gas analysis might be as good as the most critical combustion engineer could desire.

Instruments then are a great help in adjusting the air supply and in locating faults in the furnace installation, but no instruments will help pay dividends by saving fuel unless they are used intelligently and combustion conditions improved by their use. An expensive carbon dioxide recorder in the corner with the spiders playing over it is not a paying investment.

Suppose the reader took a new job

(Continued on Page 176)

LONG BEACH, CALIF., WITH SIGNAL HILLS FIELD IN BACKGROUND

The Reason for
TAYLOR BOILERS

The Taylor Boiler is designed to burn oil or gas fuel economically. The large rectangular fire box of the usual oil country boiler has been eliminated. It was designed to accommodate a large grate necessary for burning wood or coal and to give sufficient space above the grate for proper combustion of these fuels. Neither the area of grate nor space in that form is necessary for burning the fuels almost universally used in the oil fields nowadays. We have replaced this complicated weak construction with a furnace or flue 14 feet long and 20 inches in diameter with corrugations in part of its length. This is the strongest construction known to withstand exterior pressure and entirely eliminates all flat surfaces in the fire box, all staybolts, and the flat crown sheet which is protected by very little water in the old type boiler.

The first six feet of the furnace is lined with brick to hasten combustion and protect the furnace. The remainder is corrugated, which gives increased strength and provides for expansion and contraction without causing leaks. The mixtures of oil or gas and air in proper proportions for almost perfect combustion are blown into the brick-lined opening of the furnace where they are surrounded by white hot brick. The white hot brick not only gives the mixtures time to be completely burned before they come in contact with the water-cooled surface, but also brings all parts of the mixtures to a very high temperature, greatly hastening combustion. The gases then pass through the corrugated section of the furnace where they give up a considerable part of their heat and enter the brick-lined end of the boiler from which they return forward through a bank of 3-inch tubes 14 feet long surrounding the furnace. The gases, therefore, travel 28 feet through water-cooled tubes in the Taylor Boiler as compared with ten to fourteen feet in the old type boiler. The advantages are very evident. The temperature of the gases is reduced in the corrugated section of the furnace before they enter the 3-inch tubes. This helps to prevent leakage of the ends of the tubes when a boiler becomes scaled. Also, the gases are cooled to a much lower temperature before escaping through the stack.

Economy of fuel.—The Taylor Boiler is designed to take the greatest possible advantage of the transfer of heat by radiation and conduction. The incandescent masses of gas are very close to the surface and pass over the surfaces at a high rate of velocity which very muchly increases the rate at which the boiler can absorb heat. The design further permits combustion with a minimum amount of excess air. The volume of air entering the Taylor Boiler is very easily controlled. The less the percentage of excess air entering a boiler the higher the temperature and the greater the capacity and efficiency of the boiler. No fuel test made on a Taylor Boiler has disclosed a saving of less than 8% over the old type. Some tests under field conditions have shown above 20%.

Economy of Upkeep.—The principal item of expense in a boiler is due to the formation of scale on the heating surface. Scale prevents the water from carrying heat away from the steel plate which results in over-heating of the plates causing expansion and leaking at all joints, especially where tubes are rolled or staybolts and rivets are driven. Every staybolt has been eliminated from the Taylor Boiler. The flat crown sheet, which holds any deposit of mud and burns it into hard scale, has been replaced by a much smaller curved surface. Circulation over curved surfaces tends to carry the mud away rather than permit it to be deposited. The mud ring and fire door ring are also eliminated. This means that we have eliminated three of the most common causes of trouble and expense in boilers. The construction is such that when the tubes have been removed a man can reach every part of the interior surface of the boiler to remove scale and thoroughly inspect the interior. This could not be done in the old type boiler without the removal of hundreds of staybolts at a tremendous expense. The lowest part of the Taylor Boiler, at which mud and scale will naturally collect, is not in contact with any hot surfaces. Therefore, the mud will remain soft and can easily be blown out through the blow-off without damage to the boiler.

Safety.—Taylor Boilers are built strictly according to the requirements of the code of boiler construction of the American Society of Mechanical Engineers. The A. S. M. E. code has been adopted as standard by most States of the United States. The material for every boiler is inspected during its manufacture and the boiler is watched by an inspector of a well-known insurance company while it is being fabricated in our shops. The inspector sees that the plates are properly drilled, that the holes are true and straight, and that the rivets are properly driven. He watches the boilers tested to a pressure one and one-half times the pressure at which it will be used.

Construction of the Taylor Boiler is much safer than the staybolted boiler. The safety plug in the standard oil country boiler is in the crown sheet where it does not burn out until the water is entirely off the crown sheet. This permits the crown sheet to become very hot which frequently causes leakage and weakening of the staybolts holding it. Failure of these staybolts means a dangerous boiler failure. The safety plug in the Taylor Boiler is 2 inches above the top of the top tubes. If the safety plug is burned out in a Taylor Boiler there still remains two inches of water for protection before the heating surface is without water to protect it. Even then the greatest damage done would be to some of the 3-inch tubes.

Dry Steam.—The problem of getting dry steam with the elimination of a dry steam dome was given very careful consideration in the design of the Taylor Boiler. It has an unusually large water space and a disengaging surface approximately double that of other boilers of the same capacity. Even with the steam dome omitted, it has actual steam storage space in the top of the shell 22% greater than that of the ordinary boiler equipped with a dome. The Taylor Boiler is equipped with a compound steam separator which very effectively removes water from the steam as it leaves the boiler, the water being returned to the boiler and the steam passing through the nozzle. This compound steam separator has been successfully used for forty years.

Anti-Priming.—Recent test showed that a Taylor Boiler was able to hold almost constant steam pressure while pulling a swab and 500 feet of fluid through a crooked rotary hole 4,200 feet deep. The driller reported carrying three gauges of water without once pulling over. These results prove the correctness of our design.

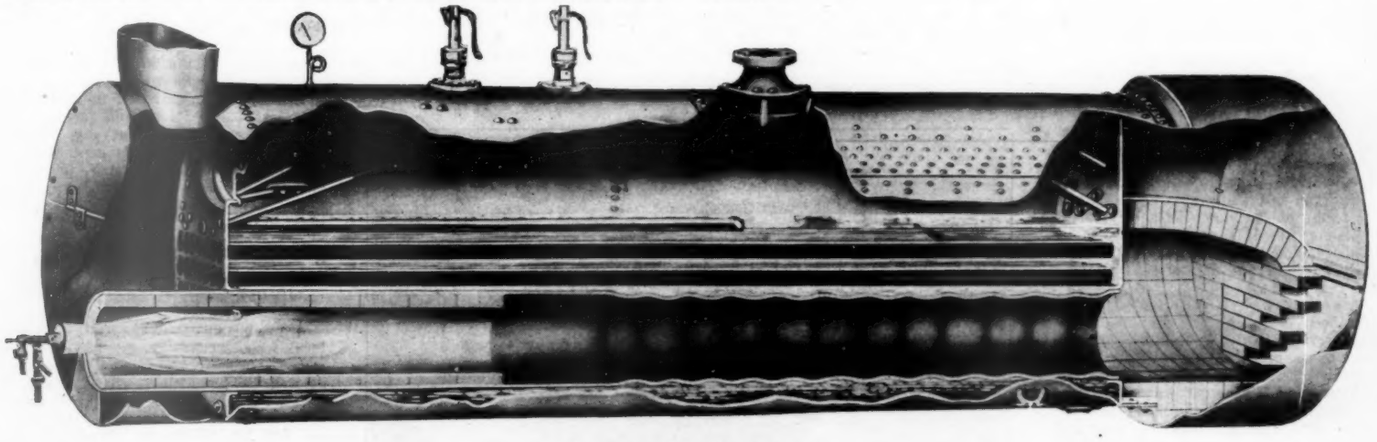
Taylor Boilers are furnished in sizes as follows:

50 Horsepower—150 Pounds Working Pressure
70 Horsepower—150 Pounds Working Pressure
70 Horsepower—200 Pounds Working Pressure
90 Horsepower—200 Pounds Working Pressure

Taylor Boilers have been in operation in the Mid-Continent fields since May, 1925. They have completed the test stage and are recognized as a vast improvement over the locomotive type boiler. The fuel consumption is low, the thermal efficiency is increased by the 28 feet of flame travel in contact with the water-cooled surface, plenty dry steam without pulling over is assured by the large water disengaging surface, and the cost of upkeep and shut-down periods will be less due to the elimination of the crown sheet and staybolts which cause so much trouble and expense in repairs. In addition to these features, it is a safe boiler to operate.

Imagine the saving in making complete repairs to a boiler in which there is not a staybolt to cut out, re-tap, replace or re-drive.

Taylor Boilers, in addition to being very efficient and economical for drilling and pumping, have proven equally efficient and economical for heating and treating oil in refineries. The Louisiana Oil Refining Corporation has secured very interesting results using these boilers at its Shreveport refinery.



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Oil Production and Refining in Egypt

Three Fields Located on the Shores of Gulf of Suez With Two Refineries at Suez. Dehydrate the Oil

By M. Samy
Egyptian Minister, Washington

There are three producing fields in Egypt, namely those of Hurghada, Gemsah and Abu Durba—all situated on the shores of the Gulf of Suez. Oil, in all cases is brought to the surface by pumping—there are no "gushers."

Hurghada is the largest field and produced in 1924 approximately 159,120 English tons of oil, an increase of 10,000 tons over the previous year but 100,000 tons lower than in 1918, the year of maximum production. The field started producing in 1914 and annual production since has been as follows:

Year	Tons	Year	Tons
1914	11,000	1920	142,900
1915	16,600	1921	175,500
1916	46,100	1922	166,200
1917	127,900	1923	149,800
1918	272,500	1924	159,500
1919	224,100		

For the first six months of 1925 production was 88,600 tons—an increase of 13,000 tons over the corresponding period in 1924.

Gemsah is the oldest producing field in Egypt. Production reached its zeinth in 1914, but since that year has rapidly fallen off, with the single exception of a small rise in 1921, to 650 tons in 1924. Annual production from 1911 onwards has been as follows:

Year	Tons	Year	Tons
1911	2,800	1918	4,900
1912	27,500	1919	3,300
1913	12,600	1920	2,700
1914	87,100	1921	4,100
1915	12,900	1922	3,000
1916	10,700	1923	670
1917	6,800	1924	650

For the first six months of the present year, production was 670 tons, as compared with 280 tons over the corresponding period in 1924.

Abu Durba Field was worked by the Government from 1918 to 1923 but with the primary objective of obtaining certain geological data rather than of the actual finding of oil. Several shallow wells were put down during the five years, varying in depth between 200 and 600 feet, and total production over that period was 1,175 tons.

At the end of 1923 this field was leased to an Egyptian group. It is to be noted that this was the first, and, so far, the only Egyptian company to undertake the exploitation of a petroleum field.

Production in 1924 was 500 tons, and for the first six months of the present year 620 tons, as against 240 tons for the corresponding period in 1924.

Nature of Crude Oils

The crude oil of Hurghada may be divided into two categories, namely "dry" and "wet." The former term is applied to oils containing 2 per cent of water and salt. The average water and salt content of "wet" crude is 30 per cent, and in certain cases is as high as 60 per cent. The salt and water is present in the form of a very refractory brine emulsion, which is very difficult to demulsify, and which has caused a great deal of trouble and difficulty in handling and refining.

A system of electrical dehydration has now been established on the fields and "wet" crude is dehydrated before shipment to the refinery. The oil after treatment is classified as "dehydrated" crude and contains 5 per cent water and salt. It should here be mentioned that the commonly used methods of electrical dehydration did not give satisfactory results when applied to Hurghada crude and that the present more or less satisfactory results have only been arrived at after three or four years experimental work by the company exploiting the Hurghada Field.

Hurghada crude oil is of heavy mixed base. It is brownish black in color, heavy and viscous, and has a comparatively small benzine and kerosene content.

Gemsah oil is a high class paraffin base of dark greenish brown color. The latest production shows a benzine content of 8 per cent and kerosene of 28 per cent.

Abu Durba oil is of a heavy asphaltic nature and contains a varying proportion of a waxy resin. The benzine content is almost negligible and kerosene content is very small. The lessee of this field is able to sell his oil in its natural state, or admixed with kerosene, as a liquid fuel.

Treatment of Crude Oils

Crude oils produced at Hurghada and Gemsah are refined in Egypt. Two petroleum refineries have been constructed at Suez of which the larger is the property of the lessee of the Hurghada and Gemsah fields and the smaller is owned and operated by the State. The former is capable of dealing with 1,500 tons of crude oil per diem. Its primary function is the refining of native oil, but the company concerned, in addition, imports crude oils and intermediate products for treatment.

The State refinery has a capacity of 60 tons per diem. Crude oil delivered as royalty to Government by the lessee of the fields is treated in the refinery. It is, also, the Government petroleum research station.

In the past it had been considered almost impossible to obtain first class products from Hurghada crude oil. Benzine and kerosene were of low grade and could not be marketed in Egypt unless admixed with considerable quantities of high class imported products. The residue could only be described as an inferior furnace fuel of high viscosity. Research work undertaken by the Government showed that high class benzine and kerosene could be manufactured; also that by a supplementary treatment of the residue not only was it possible to obtain a good quality of furnace oil but also a good Diesel fuel and pitch. The processes referred to are now applied to oil treated in the State refinery. For further information as to the method of treating this residue, reference should be made to the paper "Heavy Grade Egyptian Crude Petroleum," by W. A. Guthrie, F. I. C., etc., late petroleum research chemist to the Government. This paper was read before the Institution of Petroleum Technologists, London, in 1923, and published in the journal of that institution, Volume 9, No. 38, August, 1923.

The initial distillation of Hurghada crude oil is carried out in a topping plant. The "tops" are subsequently split up into their component products by redistilling in a continuous distillation bench and the residue is run to storage or, in the State refinery, is treated in the manner referred to in the preceding paragraph.

Pitch and fluxing oil are manufactured from Hurghada residue when required.

Gemsah crude oil is treated in a continuous distillation bench and yields high grade products.

The products obtained from Hurghada crude are benzine, kerosene, solar (gas) oil, furnace oil, fluxing oil, pitch, and (in the State refinery only) a certain quantity of Diesel oil. From Gemsah oil are obtained benzine, kerosene, solar (gas) oil and fuel oil.

Internal Trade

The internal consumption of petroleum products in Egypt is small compared with that of the United Kingdom and the United States of America, but it is worthy of note that, with the exception of furnace oil, the demand for all products is steadily increasing. Benzine, in particular, although the consumption in 1924 was but 17,500 tons, yet it represented an increase of 23 per cent over 1923 and of 139 per cent over that in 1920; statistics for the first six months of the present year show an increase of 35 per cent over the corresponding period in 1924.

Kerosene consumption in 1924 was 174,000 tons, an increase of 7 per cent over 1923 and of 34 per cent over 1920. The first six months of 1925 shows an increase of 16 per cent over the same period in 1924.

Solar (gas) oil consumption in 1924 was 12,300 tons, an increase of 31 per cent over the previous year and of 437 per cent over that in 1921. (It is doubtful whether any material quantity of this product was used in Egypt prior to 1921.)

Diesel oil used in 1924 was 31,000 tons, an increase of 35 per cent over 1923 and of 31 per cent over 1921.

Furnace oil (Mazout) used was 152,000 tons—1.5 per cent lower than in 1923 but 4.5 per cent above 1922. During the first six months of 1925 there was a drop in consumption of 15 per cent as compared with the corresponding period in 1924.

The furnace oil consumption reached its maximum in 1920, when a total of 212,000 tons were used. At the same time it should be borne in mind that from 1918 to 1921, inclusive, it was difficult, if not impossible, to obtain regular coal supplies, consequently potential consumers of coal had, perforce, to convert to oil. Towards the end of 1921 coal supplies became available and the price of that commodity dropped to a more normal figure, with the result that many previous consumers of coal reconverted from oil. Since 1921 there may be said to have been a fierce competition between coal and oil fuel. The price of coal is materially lower than that of liquid fuel and even though due allowance is made for high calorific value and the various other advantages that the liquid fuel holds over the solid, it is, in numerous instances, more economical to use coal than oil. Indeed, in certain cases the present tendency is for oil consumers to change back to coal.

In comparing internal consumption with crude oil production, it is obvious that Egypt is far from self-supporting in regard to petroleum products, and particularly so in regard to kerosene. Products are therefore imported by the various marketing companies from the United States of America, Mexico, Russia, Rumania, Persia, Borneo, etc.

Export Trade

Egypt, in view of its geographical position, is a most convenient base from which to supply countries on the shores of the Mediterranean Sea. It is therefore used as the main supply depot for Palestine, Syria, Cyprus, etc., and larger consignments of lighter products are frequently exported or reexported to Italy, France, Spain and Portugal.

An important feature in the export trade is the supplying of ships' bunkers. A certain bunker trade is carried on in Alexandria, but the bulk of the trade is confined to Port Said and Suez.

In 1924 the quantity of fuel oil bunkered was 229,000 tons and for the first six months of the present year 125,600 tons, an increase of 6 per cent over the corresponding period last year. It should also be mentioned that the bunker trade in 1923 was about 3 per cent higher than in 1924.

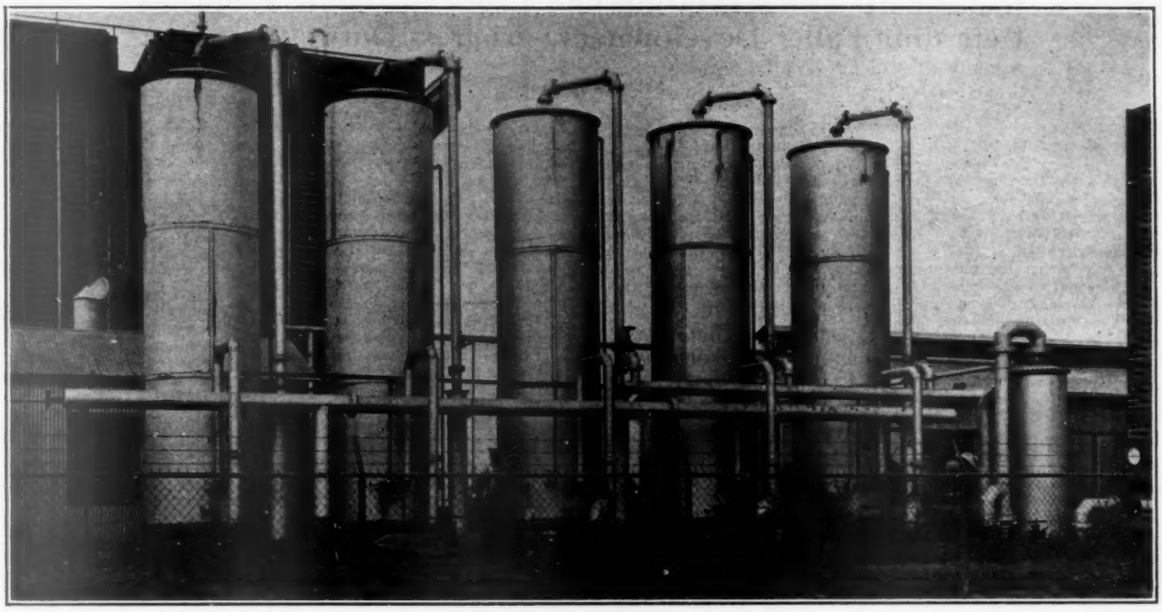
REFINING PLANT IN SOUTHEAST BORNEO

—Photo from Ewing Galloway, N. Y.

A general view of the refining plant of the Batavia Petroleum Co. in Southeast Borneo. Most of the oil deposits are in the south part of the island and, although the native population is largely Malayan and Dyak, most of the labor in the oil fields is done by Chinese, who go there to make a fortune and remain to toil.

BLAFFER CASE AMENDED

AUSTIN, Texas, Jan. 9.—Assistant Attorney General R. J. Randolph has filed an amendment to the State's petition in the $50,000,000 Blaffer oil case substituting the Goldman heirs for the late Adolph Goldman, as a party defendant, Mr. Goldman having died in Houston. It was done under agreement with counsel for Mr. Goldman. With this accomplished Mr. Randolph believes there will be no postponement of the case when it is called on January 18. It has been pending many months. Mr. Randolph left for Houston, where additional testimony was taken in the case before the commissioner appointed for that purpose. This is expected to be the last evidence before the commissioner before the case is called for trial.



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Russian Oil Situation Is Improving

Inadequate Transportation and Labor the Chief Problems Retarding Fuller Development. Progress During Past Year

By Basil B. Zavoico

During 1924-1925 operating year the general situation of the Russian oil industry continued to be unfavorable; though considerably better than at the close of 1923-1924 year. The most important unfavorable factors were and are, the lack of adequate transportation facilities, and the labor situation.

On several occasions during the past year the fields of Baku and Grozny were shut down because all available storage space was filled. This situation will be relieved within the next two or three years by building two pipe lines; one from Baku to Batoum, and the other from Grozny to Touapse on the Black Sea. The Grozny line is being built and should be ready within the next two years. Its cost is estimated at $12,500,000. The Baku line is being projected and will not be ready for at least three years. Meanwhile the Caspian Sea tankers carry the bulk of the production, while the railroads and the kerosene pipe line from Baku to Batoum take care of the remaining part.

Production In Baku Fields by Method

	1923-1924 1st half Per Cent	1923-1924 2nd half Per Cent	1924-1925 1st quarter Per Cent	1924-1925 2nd quarter Per Cent	1924-1925 3rd quarter Per Cent
Bailing	59.4	56.8	54.0	53.7	44.5
Air lift	32.3	30.6	27.5	24.3	24.8
Pumping	0.3	1.3	3.2	8.7	14.8
Gushers	4.8	8.7	13.7	11.3	13.7
Miscellaneous	3.2	2.6	1.6	2.0	2.2

The most favorable factors are the increases in demand, for home and foreign markets. Both are considerably in excess of transportation facilities. The increase in the home market is explained by the increased prosperity among farmers, consuming a large amount of kerosene, and also by considerable improvements in manufacturing industries, with a number of old factories reopening, meaning demand for fuel oil and lubricants. The foreign markets are growing naturally, and also because of marked improvements in war participating nations, especially so in Germany, Italy and Austria. The Russian industries are over-enthusiastic about fuel oil, and its plentiful supply would be a serious blow to the coal industry and would tend to premature exhaustion of the oil supply as well. Moreover, the coal is considerably cheaper at the present ratio of prices, which might mean the difference between profit and loss for most factories concerned.

In the fields themselves attention was diverted from getting the maximum production possible to the development of field and refinery engineering. The achievements in this direction during the past year are truly remarkable, and will go a long way towards creating an up to date industry as soon as demand will be balanced by adequate transportation units.

It is worth noting that practically all new operating ideas came from the United States, as well as a very considerable part of new machinery.

Production

The production remained fairly stationary. Baku district showed an increase of only 2,100,000 bbls., Grozny of 3,700,000 bbls. and Emba of 390,000 bbls.

Production In All Russian Fields

	1916	1922-1923	1923-1924	1924-1925	Estimated 1925-1926
Baku	55,810,000	25,300,000	31,300,000	33,400,000	40,000,000
Grozny	12,330,000	10,900,000	11,800,000	15,500,000	.....
Emba	1,820,000	975,000	830,000	1,220,000	.....
Total (Including minor districts.)	72,800,000	37,200,000	44,000,000	50,120,000	60,000,000

It will be of interest to note that the Soviet program calls for a production of over 120,000,000 bbls. in the year 1932-1933. It is probable that the production will exceed this figure very considerably.

Baku District

The Baku district continued to lead the Grozny fields, though its production is increasing more slowly than the production in Grozny. In 1916 Baku produced 76.7 per cent of the total Russian oil, while in 1924-1925 it produced only 67.3 per cent, a loss of nearly 10 points. It is my opinion that the Baku fields will eventually fall behind the Grozny district.

The careful analysis of production figures will show the progress during the past year.

The replacement of bailers by pumping outfits is to be marked, and is of special interest to American industry, since practically all pumping equipment was ordered in this country. The future program calls for further replacements, and within two or three years bailing will be abandoned whenever possible. On May 1924 there were only 38 wells equipped with modern pumps, and their production amounted to 3,200 bbls. On July, 1925, the number of wells equipped with pumps was 500, and the monthly production was in excess of 500,000 bbls.

Before the war it was considered that the cutting of valves by loose sands of the Baku fields would be prohibitive; and, moreover, it was thought that the action of the bailer lowered to the very bottom, thus agitating the well continuously and also cleaning out the hole by bringing the loosened sand up, could not be duplicated by pumps. However, in many instances the bailers could not be lowered to the bottom, because of crooked hole, or damaged casing, and thus their action was not what it ought to be according to the former point of view, and still such wells were good producers. At the present time the average pumping depth for the whole Baku district is 1,425 feet, and the depth to which the tubing is lowered averages 91.4 per cent of the total depth. The Azneft is installing and experimenting with deep pumping equipment at the present time. The production per day of the wells using pumping units increased from 31 bbls. in May, 1924, to 53 bbls. in June, 1925, indicating that labor is getting accustomed to the new method. It is considered that the figures will be bettered during 1925-1926.

The increase in number of producing wells since last year is partly due to new drilling and partly to bringing in to production of wells abandoned during revolution. The Azneft has created a special department for these temporarily abandoned wells; it is a combination of geological and production ends, and is reported to function remarkably well. The production of flowing wells increased markedly because of the developments of the lower horizons in Sourachany Field, and bringing in of several wells on the Bibi Eibat extension.

A good example is well No. 7 on Bibi Eibat, which made 135,000 bbls. during its first 22 days in May of this year, averaging 5,150 bbls. per day. After the sand bridged up the hole the well was cleaned out, but did not flow even when pressure was increased to 170 pounds. In the end of June a second attempt was made with the pressure increased to 400 pounds, and the well came in good for 5,400 bbls. per day. It increased to 7,800 bbls. in the beginning of July, and was flowing around 12,000 bbls. in the beginning of August. This well is producing from 3,200 foot sand, the fifteenth producing in the Bibi Eibat Field. This production and also the new horizon of the Sourachany Field show that the possibilities of deeper drilling in Baku district are good. From the surface outcrops the oil bearing strata are estimated conservatively at about 6,000 feet, or twice the present exploitation depth.

Per Well Per Day

The average per well per day production in various fields of Baku district, and by different method is presented in the table below:

	May 1924 Bbls.	July 1925 Bbls.
By Fields—		
Baku district	44.4	46.7
Old area	17.9	18.3
Sourachany	304.0	208.0
Bibi Eibat	85.5	120.0
By Method—		
Bailing	29.2	29.1
Air lift	198.0	173.0
Flowing	360.0	525.9
Pumping	31.0	53.0

Number of Producing Wells

Bailing	1,439	68.1%	
Air lift	142	6.7%	
Pumping (38)	500	23.6%	
Flowing	33	1.6%	
Total	1,939	2,174	100.0%

Both lower tables again show the progress of pumping equipment.

Power Used

A considerable progress was made in the way of power in the production department. Steam was replaced by electricity, and by internal combustion engines.

Production of Baku Fields by Power

	1923-1924 1st half Per Cent	1923-1924 2nd half Per Cent	1924-1925 1st quarter Per Cent	1924-1925 2nd quarter Per Cent	Estimated 1925-26 Per Cent	Estimated 1932-33 Per Cent
Steam	10.5	9.1	7.3	6.8	3.9	0.0
Internal comb. engines	8.5	8.1	7.6	7.6	8.5	9.0
Electric motors	81.0	82.8	85.1	85.6	87.6	91.0

The electrical motors replaced steam engines as field equipment, when the connection by power lines was considered economical. The gas engines replaced steam engines in outlying districts, while big Diesels are finding increased popularity in central power stations, pumping stations and on big tankers.

The substitution of steam power in Baku region is a real problem, since water suitable for boilers is absent; treatments of various kinds are locally successful, but it is evident that laying out of special water lines would be expensive.

The main central station in the Black Town, serving all fields and refineries, succeeded in reducing the fuel oil consumption from 0.715 kgr. per kilowatt hour during last year to 0.656 kgr. during the current year. During 1923-1924 the station used 110,000 bbls. of fuel oil, generating 22,662,000 kilowatt hours; in 1924-1925 same amount of fuel oil generated 24,183,000 kilowatt hours. This station uses water tube boilers and turbine equipment of modern design.

Drilling In Baku Fields

The progress of drilling during last year was marked. The number of rotary rigs increased from 55 last year to 86 in June, 1925, while Russian percussion rigs decreased from 147 to 88. During the same period the cable tool rigs increased from 5 to 32. The Azneft was most successful in the rate of rotary drilling which increased from 5.6 feet per day to 11.5 feet on average. The Russian rigs averaged 3.6 feet per day against 3.3 feet last year. No data were available last year for cable tool drilling, this year the average was 4.75 feet per day. The small footage in the last case is due to the fact that the cable tool system is used chiefly in finshing rotary wells, at depths from 2,500 to 3,000 feet or lower. It is evident that labor is becoming accustomed to the new equipment and that the engineering department is better able to judge the depths for setting the different strings of casing. During the next year the increase in daily footage will undoubtedly be made, both in rotary and cable tool drilling. There is not much chance to increase the footage in the case of the old Russian rod rigs, because of their inefficiency.

Rotary Methods

It will be of interest to note that the rotary drilling procedure differs considerably from the one used in the Mid-Continent fields. Because the formations are geologically very young, they are unconsolidated, and the sands, which constitute a large proportion of sediments, are loose. Consequently the wells start with the diameter up to 24 inches and drill as long as it is possible to lower the casing. When the casing freezes, a smaller diameter is used as long as it is not frozen. In this way the hole is finished with 6 or 8-inch casing set to 3,200 feet. As much casing as is safe to pull out is salvaged. In comparison with the Russian rod method this is a very considerable progress, since initial diameters reached 42 and sometimes 50 inches with old equipment, riveted stove pipe being used for casing.

The total footage drilled, and the footage by method is presented in the table below:

	Total Feet	Per Cent By Russian Rod Rigs	Per Cent By Rotary Rigs	Per Cent by Cable Tool Rigs
January, 1923	12,600	....	....	....
July, 1923	19,600	66.6	33.4	....
January, 1924	21,000	62.2	36.2	1.5
July, 1924	24,500	55.5	43.6	.9
January, 1925	21,000	50.6	44.6	4.8
July, 1925	47,600	32.1	57.1	10.8
1925-1926 (estimated)	.....	33.0	57.0	10.0
1932-1933 (estimtaed)	.....	2.7	71.7	25.6

As compared with past years the footage increased about 75 per cent over last year, and over 140 per cent over 1922-1923.

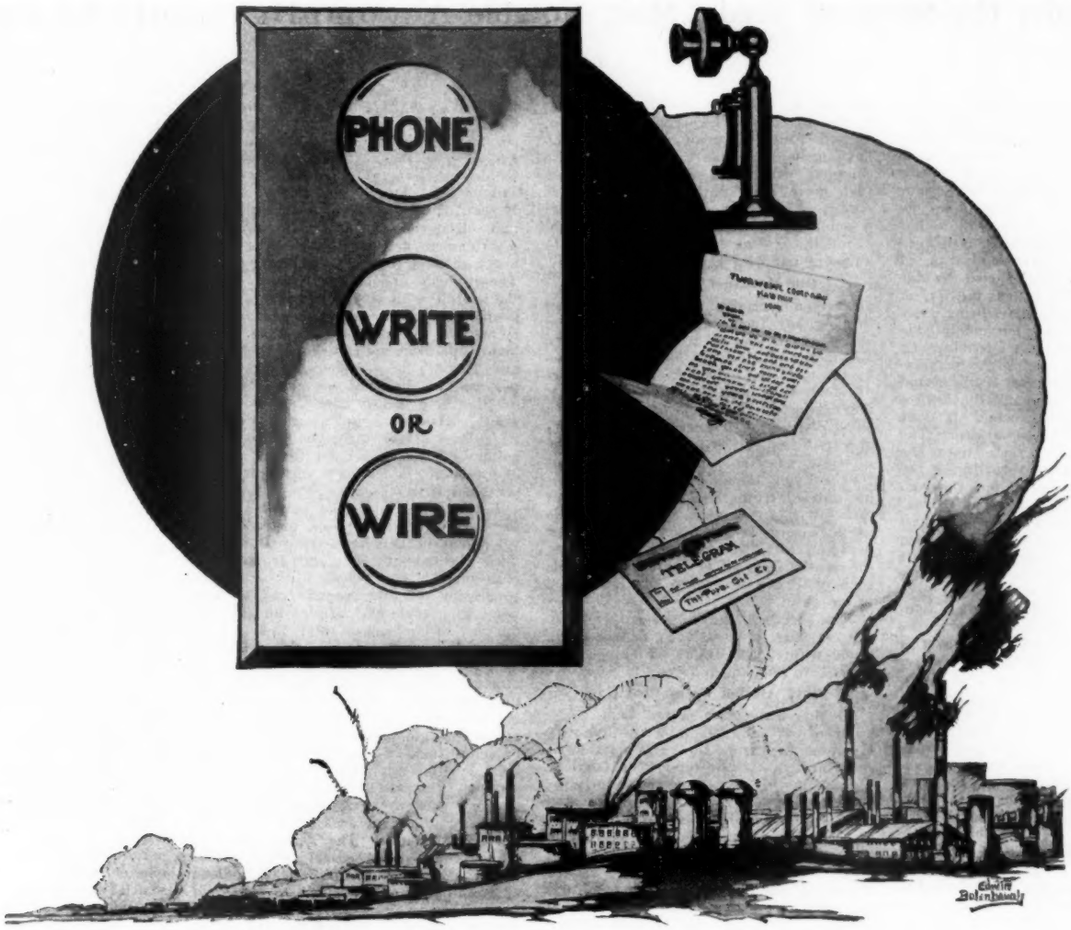
Baku District—	1921-22	1922-23	1923-24	1924-25
Total footage drilled	49,400	165,500	256,000	400,000

The present drilling rate of 47,000 feet per month is well in excess of pre-war figures.

Refineries

The capacity of Baku refineries was considerably increased since last year. About 30,000,000 bbls. were run against 22,000,000 bbls. during last operating year. The increase was due to putting in to commission of several old units, and not to building of new refineries. The

(Continued on Page 178)



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Gasoline Substitutes Gain in Europe

Potentially Revolutionary Developments Have Been Recorded in Past Year Under the Stress of Need. Most Notable Accomplishments Set Forth

By L. M. Fanning

Foreign countries, particularly Great Britain, Germany, France and Italy, which are dependent upon outside sources for their motor fuel, are devoting much attention to the development of substitutes, and during the past year some striking and potentially revolutionary developments have been recorded. The most notable accomplishments have been in connection with the carbonization of coal, the hydrogenation of coal by the Bergius process and the gasification of coal and conversion of the resulting gases by pressure synthesis into methanol, "synthol" and other liquid combustibles. Of these processes only the high temperature carbonization process is in actual commercial use, if the distillation of brown coal in Germany which is done at low temperature is excepted. The work being done along these lines has possibilities not only as regards the national motor fuel problem, but the coal problem, particularly acute in Great Britain, Germany and France. Furthermore, solution of the motor fuel problem through the coal resources is a desirable aim due to the presence of these resources in home territory.

The newspapers of Berlin and London have devoted much space during the past year to the important discoveries made in Germany, especially those relating to the utilization of coal as a source of oil fuel, based on statements credited to Professor Franz Fischer, Director of the Coal Research Institute at Muelheim. Following certain pronouncements as to these processes which are associated with the Badische Anilin und Sodafabrik, statements designed to clarify the status of the developments have been issued.

The company referred to is quoted in the London press as stating that the process for synthesizing methyl-alcohol belonging to the Badische company is a complete commercial success, and the alcohol produced by this method is now on regular sale by the company. Although methanol can be employed for the running of motor vehicles, the price of the synthesized product is so high in Berlin that there is at present not the slightest likelihood of its being used for this purpose, it is stated. One patent now under exploitation by the Badische company is stated to be that for synthesizing the compound used for deadening explosions in motors and is intended to be a substitute for tetraethyl lead.

Large Capital Involved

Some idea of the scope of the activity of German interests in these directions may be obtained by financing arrangements which have been announced. Recently a merger of the entire German chemical industry, with a capitalization of more than $160,000,000 was announced as completed. This combine, which will be the biggest in Germany since the amalgamation of the steel industries, is built around the Badische Anilin and Sodafabrik.

The partial liquefaction of coal by hydrogen under pressure according to the Bergius method has been under laboratory investigation in a number of European laboratories, one of these being a 2-ton per day unit operated by Dr. Bergius at Rheinau near Mannheim, Germany. A recent report states that a credit of 2,500,000 marks ($600,000) has been allotted jointly by the German Government and the Prussian Government to the Evag company toward erecting a factory for producing oils from coal under the Bergius process. This is being erected at the Wenceslaus mine in Lower Silesia and will have a capacity for treating 200,000 tons of coal dust a year. Drs. A. C. Fieldner and R. L. Brown, of the Pittsburgh Experimental Station, United States Bureau of Mines, who have made an exhaustive report on the complete utilization of coal and motor fuel, state that if the above report is true, full information on the commercial possibilities of the Bergius process should be available long before it is needed to augment our own gasoline supply.

Our Methanol Importations

The commercial production of methanol in Germany from carbon monoxide and hydrogen is an assured fact, Messrs. Fieldner and Brown state, as witnessed by the methanol importations in the port of New York during the present year. Disturbing as this may be to our own wood distillation industry, it unquestionably puts an entirely new aspect on the ultimate gasoline substitute for motor fuel. Even though pure methanol is an untried motor fuel the fact that it can now be synthesized on a large scale at a reasonable price opens up a new field of possibilities in which are included the synthesis of other combustile liquids such as Franz Fischer's "synthol" from water gas.

The progress that has been made on the various processes is described in some detail by Messrs. Fieldner and Brown, in part, as follows

Ethyl Alcohol From Coal Gas

In this connection, there is a possibility of virtually doubling the quantity of motor fuel from the carbonization of coal through the conversion of ethylene in coal gas into ethyl alcohol. Bury[7] at the Skinningrove Iron Works in England obtained an average yield of 1.6 gallons of alcohol per ton of coal carbonized in by-product ovens in a small experimental plant. Sulfuric acid was used as the absorbing medium to form ethyl sulfuric acid which on hydrolysis yielded ethyl alcohol. Although the English experiments were not commercially successful, Valletes[8] has recently reported that a similar process is to be installed in connection with a Claude plant for the manufacture of synthetic ammonia from by-product coke oven gas at the Bethune mines in France. The ethylene is to be separated through compression and refrigeration, from the other constituents of the coal gas. The cost is stated to compare favorably with that of distillery alcohol. Should this process eventually prove technically successful, it would afford a means of adding 65 per cent more to the motor fuel per ton of coal carbonized, which would be but 3.3 per cent of the 1924 gasoline consumption if all the coal carbonized during the year were so treated, or 30 per cent for all the coal mined. The most optimistic estimate of expansion in the use of gas and coke would put the total motor fuel to be had from this source nearer the 3.3 per cent figure than the 30 per cent.

Low Temperature Carbonization

Let us now turn our attention from the prevailing method of the coke and gas industry to the field of low temperature carbonization which, according to many writers, affords a means of replacing our petroleum resources. It is an established fact that the low temperature distillation of coal yields from two to two and a half times as much tar per ton as high temperature carbonization. Carefully conducted large scale tests by the Fuel Research Station in England[9] gave 1.4 gallons of light oil distilled from the tar and 1.6 gallons scrubbed from the gas—a total of 3 gallons per ton of coal. Fischer and Gluud in Germany obtained 2.0 to 3.8 gallons, and Davis and Parry[10] of the Bureau of Mines obtained 4.5 gallons of light oil suitable for motor fuel from the low temperature distillation of a Pittsburgh district coal on a laboratory scale. These yields are of the same order as the benzol yields of high temperature carbonization. However, they can be augmented by the pressure cracking of the low temperature tars as shown by Morrell and Egloff[11], who report a yield of 17 per cent of the total tar converted into oil distilling below 230 degrees Centigrade. Assuming an average yield of 25 gallons of tar, this would mean 4.25 gallons of motor fuel per ton of coal or a total of 6 gallons including that scrubbed from the gas.

Low temperature coke is not suitable for metallurgical purposes, hence the development of this industry will not reduce the amount of high temperature coke made. Its logical field is in the processing of our poorly coking and non-coking coals and lignites for the production of smokeless solid fuel. It is reasonable to expect in the relatively near future that 100,000,000 tons of bituminous coal, an amount equal to the annual anthracite production, will be carbonized at low temperatures. This amount would yield 600,000,000 gallons of motor fuel, or about 8 per cent of the 1924 gasoline requirement. Another reasonable expectation is that super power stations will carbonize coal at low temperature, and generate steam from the pulverized residue. The 60,000,000 tons[12] of coal burned in central power plants would thus provide 360,000,000 gallons of motor fuel which added to the yield from plants making domestic fuel would furnish a total of 960,000,000 gallons, or 13 per cent of the annual requirement. Thus it is evident that the maximum possible development of low temperature carbonization can not serve to furnish more than 20 to 30 per cent of the annual requirements, based on present day consumption. We must turn to processes in which motor fuel is one of the principal products rather than a minor by-product.

Bergius Process

Of these the Bergius process deserves serious consideration since it converts from 25 to 50 per cent of the coal into tar and oils, the yield varying with the type of coal and the conditions of hydrogenation. In this process, pulverized coal mixed with oil or tar to form a thick paste is heated at 400 to 450 degrees Centigrade in an atmosphere of hydrogen under a pressure of 150 to 200 atmospheres of hydrogen. Under these conditions the coal is converted into a black, tarry liquid, which, on distillation up to 300 degrees Centigrade, yields oils and tar to the extent of 20 to 40 per cent, according to various reports. No reliable information is available on exact yields or what proportion of this tar can be refined into motor fuel distilling under 150 degrees Centigrade. Kling[13] reports 15 per cent. One of us who visited the plant at Rheinau a year ago was told that 20 per cent of the coal was converted into neutral oils boiling below 230 degrees Centigrade and 10 to 15 per cent below 200 degrees Centigrade. On the basis of a 230 degree Centigrade end point gasoline, 1 ton of coal would yield 50 gallons. It is claimed that retreatment of the heavier oil increases the yield of lower boiling constituents. Other investigators, notably Shatwell and Graham[14] in England, and Fischer and Frey[15] in Germany, have confirmed the essential facts of the Bergius process. Fischer and Frey working at 75-100 atmosphere at 425-450 degrees Centigrade converted semi-coke from brown coal into oils and gas in 45.2 per cent and 30 per cent yields, respectively.

We may, therefore, regard the Bergius process as one of the possible future methods for making a petroleum substitute from coal. But it must be emphasized that in this process, a gasoline substitute is only one of the products, the gasoline being in about the same proportion as in a light crude petroleum. From the standpoint of motor fuel production, the direct synthesis from gases seems more economical.

Synthetic Motor Fuel From Gases

The investigations of Patart[16] and Audibert[17] in France, and Fischer[18] and the Badische Anilin and Soda-Fabriken in Germany, together with the production of methanol from carbon monoxide and hydrogen on a commercial scale by the latter has put a totally new outlook on the entire subject of our future motor fuel supply. In this process, pure methanol is produced from two volumes of hydrogen to one of carbon monoxide when subjected to pressures of 150 to 250 atmospheres and temperatures of from 300 to 425 degrees Centigrade in a copper lined reaction chamber, containing one or more of a number of catalysts which include zinc oxide or oxides of chromium, vanadium, manganese, tungsten, uranium, lead and bismuth. The cost reported from both French[19] and German[20] sources varies from 18 to 27 cents per gallon. About 18 per cent of the heat value of the constituent gases is consumed in the conversion. There are no by-products. On a volume basis, the net or low heating value of pure methyl alcohol is about 60 per cent of that of gasoline. Ricardo[21] has shown that the indicated thermal efficiency at the highest useful compression for methyl alcohol is 35.0 per cent as compared to 31.4 per cent for gasoline at its highest compression—the compression ratios being 5.2 for methyl alcohol and 5.0 for gasoline. It should, therefore, require 1.5 to 1.6 gallons of methyl alcohol to be the fuel equivalent of 1 gallon of gasoline. One ton of coke should yield 350 gallons of methyl alcohol.

However, we need not confine ourselves to methanol, the experiments of Franz Fischer[22], director of the Institute

(Continued on Page 150)

[7]Bury, E., alcohol from ethylene from coal gas; Gas Jour. 148, 718; Gas World 78, 123; Gas Jour. 151, 449.

[8]Valleto, commercial manufacture of synthetic alcohol; Chimie et Industrie, 18 (1925) pp 718-21.

[9]Fuel Research Board report for the years 1920-21, Second Section; Low Temperature Carbonization (H. M. Stationery Office).

[10]Carnegie Institute of Technology Bulletin 8, 1924.

[11]C. A. p. 1770; 2407 (1925).

[12]Power, January 6, 1925, pp. 2 and 20.

[13]Kling, M. Andre, liquid combustibles from the Bergius process, Chaleur et Industrie, Special Number, December, 1924, pp. 53-71.

[14]Shatwell, H. G., and Graham, J. Ivon, the hydrogenation and liquefaction of coal; Fuel in Science and Practice, vol. 4, pp. 25, 75, 127.

[15]Brennstoff-Chemie 6, 69-79 (1925) C. A. 19, 1763.

[16]Patart, Georges, a new field of catalysis under high pressure; Commercial synthesis of methanol; Chimie et Industrie 13, pp. 179-86 (1926).

[17]Audibert, Etienne, the manufacture of synthetic liquid fuels from mixtures of carbon and hydrogen; Chimie et Industrie 13, pp. 186-94 (1925).

[18]Fischer, Franz, and Tropsch, Hans, Uber die Herstellung von Synthol durch Aufban aus Kohlenoxyd und Wasserstoff; Brennstoff-Chimie 4, 193; and 5, 201, 217.

[19]Patart, loc. cit.

[20]Elworth, R. T., Canadian Chem. Met. 9, 139 (1925).

[21]Report of the Empire Motor Fuels Committee; the Inst. of Automobile Engineers, vol. 18, part 1 (1923-24), p. 144.

[22]Fischer, Franz, liquid fuels from water gas; Ind. & Eng. Chem., vol. 17., p. 574 (1925).

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Petroleum Statistics for the Month of November, 1925

By G. R. Hopkins, Petroleum Economist

Crude Petroleum—The production of crude petroleum in the United States, for the month of November, 1925, as reported to the Bureau of Mines, Department of Commerce, amounted to 61,658,000 bbls., a daily average of 2,055,000 bbls. This represents a decrease from October production of 21,000 bbls. per day, or 1 per cent. Of the seven districts, the Rocky Mountain district was again the only one to show an increase in production, though declines were recorded in the States of Wyoming and New Mexico. Production in California continued to decline. In the Mid-Continent Field the daily average production of Oklahoma was almost 500,000 bbls. per day, an increase over October of 13,000 bbls. This is entirely offset by a drop in Texas, the production of which has been steadily declining since early in the year. Of the total daily production of the country, 43,748,000 bbls., or 70 per cent, was of light crude, and 17,910,000 bbls., or 30 per cent, of heavy crude.

Stocks of crude oil east of California amounted to 296,690,000 bbls. on November 30, 1925, a decline during the month of 1,270,000 bbls. This compares with 319,859,000 bbls. on hand November 30, 1924, and is the lowest point in stocks since February, 1924. Most of the above-mentioned decline was in refinery storage, which dropped off almost 1,000,000 bbls. In California stocks of both light and heavy crude (including all grades of fuel oil) continued their steady rise.

Refined Products—Runs to stills of crude petroleum during the month of November, 1925, amounted to 60,521,000 bbls., of which 3,535,000 bbls. was foreign crude oil. This represents a decrease in daily average crude runs from October, 1925, of 3 per cent, but is an increase over November, 1924, of 10 per cent. Gasoline production for the month amounted to 922,058,000 gallons, a daily average of 30,735,000 gallons. Despite a decrease in runs to stills, this represents a slight increase in gasoline production over October, which was probably due to the increased use of natural-gas gasoline. Domestic demand amounted to 758,111,000 gallons, a daily average of 25,270,000 gallons, and a decrease from the previous month of 6 per cent. Exports showed a material increase, yet stocks were increased 60,000,000 gallons, standing November 30, 1925, at 1,589,880,000 gallons. Comparing November, 1925, with November, 1924, production, exports, and domestic demand were 21, 22 and 9 per cent higher, respectively, but stocks showed an increase of 40 per cent. Assuming that imports, exports and domestic demand will remain constant during December, these stocks represent 59 days' supply as compared with 53 days' supply on hand the previous month, and 45 days' supply on hand November 30, 1924.

Both production and consumption of kerosene showed material increases and stocks were reduced 20,000,000 gallons, standing November 30, 1925, at 314,554,000 gallons.

The production of lubricants increased, exports decreased, and stocks rose to 293,912,000 gallons—a record high figure.

The production of gas and fuel oils fell off as runs to stills decreased. Stocks were reduced 70,000,000 gallons as demand for heating purposes increased.

The refinery figures of this report were compiled from schedules of 320 refineries which operated during November at 79 per cent of their recorded daily crude oil capacity of 2,544,000 bbls. This compares with 320 refineries operating at 81 per cent of 2,550,000 bbls. daily capacity in October.

PRODUCTION OF CRUDE PETROLEUM, BY FIELDS AND STATES, WITH CLASSIFICATION BY GRAVITY

(Barrels of 42 U. S. gallons.)

Field—	October, 1925* Total	October, 1925* Daily Av.	November, 1925— Total	November, 1925— Daily Av.	Jan.-Nov., 1925	Jan.-Nov., 1924†
Appalachian	2,344,000	75,613	2,173,000	72,433	25,049,000	24,904,000
Lima-Indiana	173,000	5,581	152,000	5,067	1,964,000	2,127,000
Illinois-S. W. Ind.	731,000	23,581	687,000	22,900	7,814,000	8,083,000
Mid-Continent	35,071,000	1,131,329	33,812,000	1,127,070	383,055,000	344,453,000
Gulf Coast	2,767,000	89,258	2,586,000	86,200	28,265,000	26,394,000
Rocky Mountain	3,251,000	104,870	3,152,000	105,067	32,363,000	40,431,000
California	20,015,000	645,648	19,096,000	636,530	210,898,000	210,115,000
Total U. S.	64,352,000	2,075,871	61,658,000	2,055,267	695,108,000	656,507,000
State—						
Arkansas	6,389,000	206,097	5,988,000	199,600	68,755,000	42,859,000
California	20,015,000	645,648	19,096,000	636,530	210,898,000	210,115,000
Colorado	143,000	4,613	165,000	5,500	1,006,000	389,000
Illinois	677,000	21,839	638,000	21,267	7,220,000	7,466,000
Indiana	66,000	2,129	60,000	2,000	761,000	870,000
Southwestern	54,000	1,742	49,000	1,633	549,000	617,000
Northeastern	12,000	387	11,000	367	167,000	253,000
Kansas	3,453,000	111,387	3,272,000	109,067	35,071,000	26,581,000
Kentucky	553,900	17,868	523,300	17,643	6,243,900	6,837,700
Louisiana	1,717,000	55,387	1,692,000	56,400	18,385,000	19,474,000
Gulf Coast	345,000	11,129	397,000	13,233	2,813,000	2,255,000
Rest of State	1,372,000	44,258	1,295,000	43,167	15,572,000	17,219,000
Montana	474,000	15,290	491,000	16,367	3,657,000	2,592,000
New Mexico	145,000	4,677	138,000	4,600	844,000	82,000
New York	149,000	4,806	142,000	4,733	1,510,000	1,318,000
Ohio	617,000	19,904	565,000	18,833	6,565,000	6,258,000
Central and Eastern	456,000	14,710	424,000	14,133	4,768,000	4,384,000
Northwestern	161,000	5,194	141,000	4,700	1,797,000	1,874,000
Oklahoma	15,070,000	486,126	14,977,000	499,236	162,752,000	158,265,000
Osage County	2,262,000	72,968	2,110,000	70,333	26,128,000	36,163,000
Rest of State	12,808,000	413,158	12,867,000	428,903	136,624,000	122,102,000
Pennsylvania	679,000	21,903	629,000	20,967	7,202,000	6,903,000
Tennessee	2,100	68	4,700	157	17,100	7,300
Texas	11,209,000	361,581	10,469,000	348,967	132,057,000	123,668,000
Gulf Coast	2,422,000	78,129	2,189,000	72,967	26,152,000	24,139,000
Rest of State	8,787,000	283,452	8,280,000	276,000	105,905,000	99,529,000
West Virginia	504,000	16,258	444,000	14,800	5,308,000	5,454,000
Wyoming	2,489,000	80,290	2,358,000	78,600	26,856,000	37,357,000
Salt Creek	1,894,000	61,097	1,787,000	59,567	19,735,000	29,359,000
Rest of State	595,000	19,193	571,000	19,035	7,121,000	7,998,000
Classification by gravity (approx.)—						
Light crude	45,323,000	1,462,032	43,748,000	1,458,267	497,384,000	499,769,000
Heavy crude	19,029,000	613,839	17,910,000	597,000	197,724,000	156,738,000

*Revised. †Final figures.

STOCKS OF CRUDE PETROLEUM HELD IN THE UNITED STATES (BARRELS)

AT REFINERIES (reported by location of storage):		Oct. 31, 1925*	Nov. 30, 1925	Nov. 30, 1924†
East Coast:				
Domestic		6,079,000	5,134,000	7,974,000
Foreign		2,290,000	2,550,000	1,419,000
Appalachian		1,374,000	1,402,000	1,336,000
Indiana, Illinois, etc.		1,091,000	1,116,000	1,583,000
Oklahoma, Kansas, etc.		3,793,000	3,578,000	5,442,000
Texas:				
Inland		984,000	1,116,000	1,313,000
Gulf Coast:				
Domestic		5,169,000	5,329,000	5,023,000
Foreign		610,000	491,000	355,000
Arkansas and Inland Louisiana		715,000	926,000	208,000
Louisiana, Gulf Coast:				
Domestic		3,384,000	2,784,000	4,474,000
Foreign		1,095,000	1,178,000	1,219,000
Rocky Mountain		1,449,000	1,540,000	1,206,000
Total U. S., east of California		28,033,000	27,144,000	31,552,000
ELSEWHERE THAN AT REFINERIES (reported by field of origin):				
Appalachian:				
New York, Pennsylvania, West Virginia	Gross	7,124,000	7,227,000	7,233,000
Eastern and Central Ohio:	Net	6,820,000	6,924,000	6,981,000
Kentucky:	Gross	1,814,000	1,859,000	2,521,000
	Net	1,706,000	1,754,000	2,398,000
Lima-Indiana:	Gross	1,260,000	1,237,000	1,433,000
	Net	1,058,000	1,035,000	1,218,000
Illinois-Southwest Indiana:	Gross	11,047,000	11,048,000	11,562,000
	Net	10,574,000	10,577,000	11,031,000
Mid-Continent:				
Oklahoma, Kansas; Central, North and West Texas:	Gross	170,882,000	169,606,000	192,574,000
	Net	159,108,000	158,124,000	181,489,000
Northern Louisiana and Arkansas:	Gross	43,929,000	44,331,000	36,793,000
	Net	41,598,000	42,056,000	34,756,000
Gulf Coast:	Gross	20,392,000	20,193,000	21,112,000
	Net	19,976,000	19,813,000	20,723,000
Rocky Mountain:	Gross	28,604,000	28,728,000	28,969,000
	Net	28,563,000	28,684,000	28,931,000
Total U. S. pipe line and tank farm stocks	Gross	285,052,000	284,229,000	302,197,000
east of California:	Net	269,403,000	268,967,000	287,533,000
FOREIGN CRUDE PETROLEUM on Atlantic Coast		47,000	79,000	202,600
FOREIGN CRUDE PETROLEUM on Gulf Coast		480,000	500,000	572,000
Grand total refinery, pipe line and tank farm stocks east of California, and stocks of foreign crude held in the United States by importers elsewhere than at refineries:		297,963,000	296,690,000	319,859,000
CLASSIFICATION BY GRAVITY (approx.):				
East of California, elsewhere than at refineries:				
Light crude (24 degrees and above)		221,991,000	221,104,000	.....
Heavy crude (below 24 degrees):				
Domestic		47,412,000	47,863,000	.....
Foreign		527,000	579,000	.....
CALIFORNIA (stocks as defined in July report):				
Light		43,773,000	44,426,000	.....
Heavy		80,596,000	81,807,000	.....

*Revised. †Final figures.

IMPORTS AND EXPORTS OF CRUDE PETROLEUM (BARRELS)

(From Bureau of Foreign & Domestic Commerce)

	October, 1925 Total	October, 1925 Daily Av.	November, 1925— Total	November, 1925— Daily Av.	Jan.-Nov., 1925	Jan.-Nov., 1924
Imports	4,367,900	140,871	4,891,000	163,033	57,645,000	71,934,000
From Mexico	4,079,000	131,581	3,599,000	119,967	51,820,000	68,138,000
From other countries	288,000	9,290	1,292,000	43,066	5,825,000	3,796,000
Exports	1,290,000	41,613	740,000	24,667	12,476,000	16,994,000
Domestic crude oil:						
To Canada	1,026,000	33,097	508,000	16,933	8,158,000	10,506,000
To other countries	252,000	8,129	229,000	7,634	4,122,000	6,136,000
Foreign crude oil	12,000	387	3,000	100	196,000	352,000

INDICATED DELIVERIES OF CRUDE PETROLEUM, EXCLUSIVE OF CALIFORNIA GRADES, TO DOMESTIC CONSUMERS (BARRELS)

(Production plus imports minus exports* plus stocks, exclusive of consumers stocks, at beginning of month minus stocks at end of month.)

Domestic petroleum by fields of origin:	October, 1925† Total	October, 1925† Daily Av.	November, 1925— Total	November, 1925— Daily Av.	Jan.-Nov., 1925	Jan.-Nov., 1924
Appalachian	2,505,000	80,806	2,021,000	67,367	25,657,000	24,745,000
Lima-Indiana	215,000	6,936	175,000	5,833	2,150,000	1,887,000
Illinois-S. W. Indiana	777,000	25,065	684,000	22,800	8,107,000	8,142,000
Mid-Continent	34,735,000	1,120,484	34,338,000	1,144,600	398,433,000	331,900,000
Gulf Coast	3,016,000	97,290	2,749,000	91,634	29,352,000	29,974,000
Rocky Mountain	3,268,000	105,419	3,031,000	101,033	32,361,000	31,406,000
Deliveries and exports	44,516,000	1,436,000	42,998,000	1,433,267	496,050,000	428,054,000
Deliveries	43,238,000	1,394,774	42,261,000	1,408,700	483,770,000	411,412,000
Foreign petroleum	4,567,000	147,323	4,836,000	161,200	57,604,000	72,191,000
Deliveries of domestic and foreign petroleum	47,805,000	1,542,097	47,097,000	1,569,900	541,374,000	483,603,000

*Including exports of California crude oil. †Revised.

NUMBER OF PRODUCING OIL WELLS COMPLETED*

October, 1925	1,420
November, 1925	1,188
January-November, 1925	16,386
January-November, 1924	13,580

*For States east of California, from The Oil and Gas Journal; for California, from the American Petroleum Institute.

SHIPMENTS OF CALIFORNIA OIL THROUGH PANAMA CANAL TO EASTERN PORTS IN THE UNITED STATES

(From Panama Canal Record)

	October, 1925*	November, 1925	Jan.-Nov., 1925	Jan.-Nov., 1924
Crude oil: Long tons (2,240 lbs.)	70,000	92,000	1,832,000	5,158,000
Barrels (approx.)	511,000	675,000	13,380,000	37,656,000
Refined products: Long tons (2,240 lbs.)	122,000	182,000	1,481,000	608,000

*Revised.

COMPARATIVE ANALYSES OF MAJOR REFINED PRODUCTS, NOVEMBER, 1925, AND PRECEDING MONTHS

	Production	Imports*	Exports*	Stocks End of Period	Domestic Demand
Gasoline (gals.):					
September	906,109,000	7,633,000	91,441,000	1,514,150,000	848,867,000
October	944,433 000	9,009,000	106,570,000	1,529,248,000	831,774,000
November	922,058,000	15,684,000	118,999,000	1,589,880,000	758,111,000
Kerosene (gals.):					
September	197,834,000	1,742,000	68,112,000	352,656,000	180,298,000
October	215,158,000	80,000	87,937,000	335,001,000	144,956,000
November	212,665,000	92,000	78,963,000	314,554,000	154,241,000
Lubricants (gals.):					
September	107,707,000	25,000	23,654,000	283,925,000	82,676,000
October	109,534,000	42,000	31,801,000	286,595,000	75,105,000
November	110,467,000	49,000	29,643,000	293,912,000	73,556,000
Wax (lbs.):					
September	46,713,000	219,000	29,256,000	108,679,000	26,081,000
October	50,182,000	734,000	32,961,000	113,649,000	12,985,000
November	49,087,000	1,125,000	31,107,000	111,231,000	21,523,000
Gas and fuel oils (gals.):					
September	1,280,955,000	27,402,000	117,934,000	1,256,435,000†	.....
October	1,321,652,000	30,695,000	121,674,000	1,215,829,000†	.....
November	1,229,771,000	22,651,000	133,316,000	1,145,181,000	.....
November, 1924, for comparison:					
Gasoline (gals.)	762,046,000	14,958,000	97,851,000	1,133,169,000	698,359,000
Kerosene (gals.)	233,521,000	36,000	67,628,000	337,448,000	136,605,000
Lubricants (gals.)	94,948,000	24,000	30,144,000	242,246,000	70,579,000
Wax (lbs.)	43,003,000	766,000	28,654,000	92,676,000	13,514,000
Gas and fuel oils (gals.)	1,134,147,000	32,267,000	124,966,000	1,641,090,000	1,011,943,000

*From Bureau of Foreign & Domestic Commerce. Exports, except for wax, include shipments to Alaska, Hawaii and Porto Rico.
†These stocks for east of California only.

RUNS TO STILLS AND OUTPUT OF REFINERIES IN THE UNITED STATES, NOVEMBER, 1925

Oils run to stills (bbls.):	Crude Oils— Domestic	Crude Oils— Foreign	Unfinished Oils	Natural-Gas Gasoline	Total Oils Run to Stills
East Coast	7,644,463	2,255,887	296,455	326,135	10,522,940
Appalachian	2,044,614	.....	86,898	29,503	2,161,015
Indiana, Illinois, etc.	5,311,026	.....	269,793	88,612	5,669,425
Oklahoma, Kansas, etc.	7,340,950	.....	316,261	234,019	7,891,230
Texas	10,922,654	729,460	943,432	415,970	13,011,516
Louisiana and Arkansas	5,208,310	549,845	207,937	49,106	6,015,198
Rocky Mountain	2,365,457	.....	755,669	64,570	3,185,696
California	16,148,389	.....	339,779	449,923	.....
Total U. S.	56,985,857	3,535,192	3,216,224	1,657,838	65
Daily average 11/25	1,899,528	117,840	107,208	55,261	2,179,834

Southwestern

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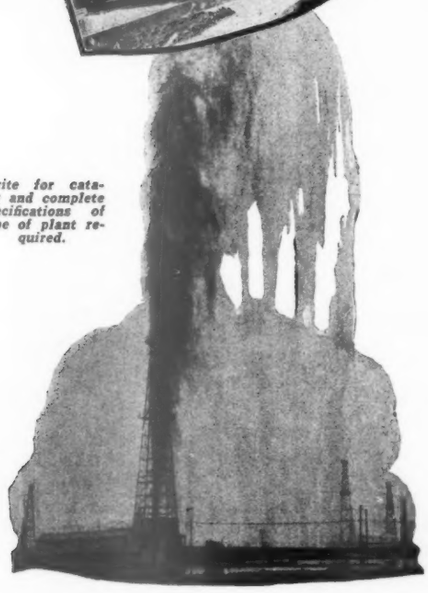
"Southwestern" plants pay dividends, a fact which should commend "Southwestern" Equipment to your careful attention and investigation.

The reproductions above, made from unretouched photographs, show the "Southwestern" Portable Absorption Plant, Collins Portable Water Tube Boiler, and a refinery designed and erected complete. Complete absorption plants have been installed in the Baldwin Hills Inglewood Field, Long Beach, Wilmington, Torrance, Athens, Rosecrans, Taft and Mid-Continent Fields:



Write for catalog and complete specifications of type of plant required.

Complete Refinery Equipment

Condensers	Dephlegmators	Steam Stills
Heat Exchangers	Fractionators	Mist Extractors
Preheaters	Absorption Towers	Rectifiers
Oil Coolers	Water Cooling Towers	Blow Cases
Gas Coolers	Bubble Towers	Separators
Evaporators	Collins Water Tube Boilers	
	Portable Gasoline Absorption Plants	

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Complete Refineries *Absorption Plants* *Charcoal Plants*
Industrial Plants *Power Plants*

SOUTHWESTERN ENGINEERING CORP.
1221 HOLLINGSWORTH BLDG.
Los Angeles, Calif.

Daily average 10/25...	1,963,281	105,408	100,759	46,329	2,215,777
Texas Gulf Coast	8,187,987	729,460	854,000	390,230	10,161,677
Louisiana Gulf Coast...	3,759,483	549,845	173,602	.....	4,482,930
Output and losses:	Gasoline (Gals.)	Kerosene (Gals.)	Gas and Fuel Oils (Gals.)	Lubricants (Gals.)	Wax (Lbs.)
East Coast	143,340,000	44,826,000	166,508,000	31,208,000	19,312,000
Appalachian	37,061,000	11,761,000	17,649,000	14,725,000	7,155,000
Indiana, Illinois, etc.	117,578,000	20,527,000	60,167,000	14,261,000	6,248,000
Oklahoma, Kansas, etc. ...	159,976,000	30,869,000	107,937,000	8,813,000	3,718,000
Texas	190,216,00	54,746,000	222,113,000	27,320,000	5,021,000
Louisiana and Arkansas ...	56,254,000	19,569,000	133,863,000	3,606,000	3,185,000
Rocky Mountain	57,164,000	8,850,000	40,559,000	2,425,000	4,448,000
California	160,469,000	21,517,000	480,975,000	8,109,000	.....
Total U. S.	922,058,000	212,665,000	1,229,771,000	110,467,000	49,087,000
Daily average 11/25...	30,735,000	7,089,000	40,992,000	3,682,000	1,636,000
Daily average 10/25...	30,466,000	6,941,000	42,634,000	3,533,000	1,619,000
Texas Gulf Coast	146,961,000	46,119,000	169,643,000	25,523,000	4,654,000
Louisiana Gulf Coast..	44,430,000	17,893,000	88,187,000	3,601,000	3,185,000
Output and losses (cont.):	Coke (Tons)	Asphalt (Tons)	Other Fin. Prod. (Gals.)	Unfinished Prod. (Gals.)	Losses (Bbls.)
East Coast	16,001	110,527	3,343,000	3,484,000	413,000
Appalachian	1,273	.....	1,096,000	1,339,000	137,000
Indiana, Illinois, etc.	18,083	14,921	4,613,000	5,244,000	160,000
Oklahoma, Kansas, etc.	6,528	22	4,302,000	5,908,000	283,000
Texas	19,152	27,044	171,000	17,098,000	581,000
Louisiana and Arkansas...	11,319	36,123	5,393,000	18,441,000	98,000
Rocky Mountain	9,971	1,920	8,000	17,753,000	56,000
California	.....	27,846	8,942,000	18,900,000*	142,000
Total U. S.	82,327	218,403	27,868,000	88,167,000	1,870,000
Daily average 11/25...	2,744	7,280	929,000	2,939,000	62,000
Daily average 10/25...	2,799	9,174	808,000	2,953,000	64,000
Texas Gulf Coast	16,920	27,044	.....	7,493,000	504,000
Louisiana Gulf Coast..	10,699	34,841	5,045,000	15,585,000	62,000

*Includes 134,310 bbls. net tops produced.

GASOLINE PRODUCTION BY THE VARIOUS METHODS, NOVEMBER, 1925

(Gallons)

	Straight Run	Pct.	Cracked	Pct.	Natural-Gas Gasoline	Pct.	Total
East Coast	77,079,000	54	52,563,000	37	13,698,000	9	143,340,000
Appalachian	25,074,000	68	10,748,000	29	1,239,000	3	37,061,000
Indiana and Illinois	72,236,000	62	41,620,000	35	3,722,000	3	117,578,000
Oklahoma and Kansas	108,115,000	67	42,662,000	27	9,199,000	6	159,976,000
Texas	108,802,000	57	63,943,000	34	17,471,000	9	190,216,000
Louisiana and Arkansas	41,220,000	73	12,972,000	23	2,062,000	4	56,254,000
Rocky Mountain	29,290,000	51	25,162,000	44	2,712,000	5	57,164,000
California	141,275,000	88	297,000	..	18,897,000	12	160,469,000
Total U. S.	603,091,000	65	249,967,000	27	69,000,000	8	922,058,000
Total U. S. 10/25	623,710,000	66	260,402,000	28	60,321,000	6	944,433,000
Tex. and La. Gulf Coasts*	107,484,000	56	67,514,000	35	16,390,000	9	191,388,00*

*Included above under Texas, Louisiana and Arkansas.

STOCKS HELD BY THE REFINING COMPANIES IN THE UNITED STATES, NOVEMBER 30, 1925

	Gasoline (Gals.)	Kerosene (Gals.)	Gas and Fuel Oils (Gals.)	Lubricants (Gals.)
East Coast	327,710,000	47,670,000	273,384,000	109,094,000
Appalachian	30,158,000	10,069,000	26,830,000	26,378,000
Indiana and Illinois	162,265,000	37,285,000	47,652,000	31,033,000
Oklahoma and Kansas	97,389,000	18,671,000	187,852,000	16,834,000
Texas	195,248,000	91,990,000	339,349,000	53,750,000
Louisiana and Arkansas	205,975,000	24,297,000	200,960,000	4,806,000
Rocky Mountain	158,514,000	14,348,000	69,154,000	6,314,000
California	412,621,000	70,224,000	.....	35,742,000
Total U. S.	1,589,880,000	314,554,000	1,145,181,000	293,912,000
Total U. S. 10/31/25	1,529,248,000	335,001,000	1,215,829,000	286,595,000
Texas Gulf Coast	170,710,000	78,832,000	285,659,000	51,833,000
Louisiana Gulf Coast	201,793,000	23,830,000	163,746,000	4,801,000
	Wax (Lbs.)	Coke (Tons)	Asphalt (Tons)	Other Fin. Prod. (Gals.)	Unfinished Oils (Bbls.)
East Coast	47,624,000	26,298	83,523	5,231,000	6,424,000
Appalachian	15,167,000	917	79	1,824,000	999,000
Indiana, Illinois, etc.	21,595,000	6,377	10,592	17,092,000	3,540,000
Oklahoma, Kansas, etc.	4,009,000	25,261	893	3,896,000	1,909,000
Texas	9,626,000	71,173	9,032	234,000	7,722,000
Louisiana and Arkansas ..	3,918,000	59,391	22,023	2,630,000	2,379,000
Rocky Mountain	9,103,000	58,589	7,634	24,000	1,786,000
California	169,000	.....	28,518	6,834,000	*13,334,000
Total U. S.	111,231,000	248,096	162,294	37,765,000	38,093,000
Total U. S. 10/31/25...	113,649,000	247,434	152,386	40,168,000	39,361,000
Texas Gulf Coast	9,270,000	70,383	9,032	16,000	7,198,000
Louisiana Gulf Coast..	3,918,000	56,405	21,573	1,970,000	1,967,000

*Includes 6,342,000 bbls. tops in storage.

NATURAL-GAS GASOLINE, NOVEMBER, 1925

The production of natural-gas gasoline in the United States continued to increase, the November, 1925, output of 102,400,000 gallons being an increase in daily average production over October, 1925, of 4 per cent. Greater activity in the North Texas area was mainly responsible for the November increase. Stocks of raw natural-gas gasoline at the plants amounted to 12,983,000 gallons November 30, 1925, a decrease from October stocks of 1,778,000 gallons. Blending at the plants continued to be a minor factor, and stocks of blended motor fuel showed no material change.

	Natural-Gas Gasoline		Blended Motor Fuel		
	Production (Net)*	Stocks End of Month	Natural-Gas Gasoline Used in Blends	Naphtha or Other Oil Used in Blends	Stocks End of Month
Appalachian	8,900,000	2,871,000	261,000	433,000	273,000
Indiana, Illinois, etc.	1,800,000	221,000	75,000	9,000	12,000
Oklahoma, Kansas, etc.	38,600,000	5,565,000	2,292,000	4,960,000	1,837,000
Texas	16,700,000	2,195,000	219,000	1,041,000	395,000
Louisiana and Arkansas ...	5,400,000	1,176,000	28,000	.....	2,000
Rocky Mountain	2,800,000	117,000	60,000	152,000	655,000
Total east of California	74,200,000	12,145,000	2,935,000	6,595,000	3,174,000
California	28,200,000	838,000	Not available		24,000
Total U. S.	102,400,000	12,983,000	.....	.....	3,198,000
Daily average	3,413,000	.....	.....	.....	.....

*Estimated in part.

The indicated output of motor fuel in the United States from the above and other sources may be expressed by the following table:

(Gallons)	Oct.,1925	Nov., 1925
Gasoline produced at refineries	944,400,000	922,000,000
Natural-gas gasoline produced at plants	101,600,000	102,400,000
Benzol production (approximate)	*6,000,000	*6,600,000
Less natural-gas gasoline blended at refineries.....	60,300,000	69,000,000
Less natural-gas gasoline run through refinery pipe lines	9,000,000	9,000,000
Total United States	982,700,000	953,000,000
Daily average	31,700,000	31,800,000

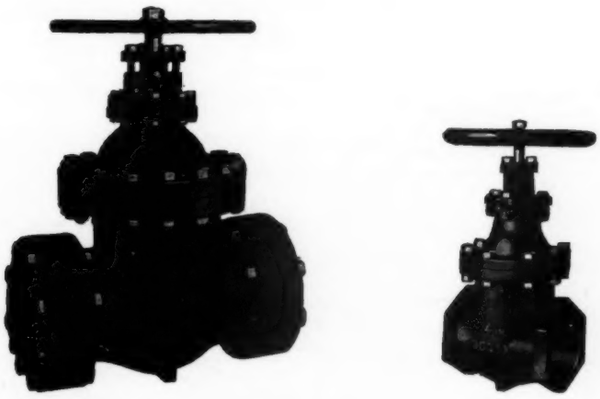
*Bureau of Mines figures for the production of by-product coke indicate an increase in benzol production of November over October, but the difference is too small to affect this table.

VIEW OF AVALON BAY, CATALINA ISLAND, FAMOUS PACIFIC PLEASURE RESORT

ROUGH TREATMENT

—means nothing to Westcott Valves —they're built for it—and because of their absolute dependability plus strength and simple mechanism these Valves are the choice of operators who will not tolerate doubtful equipment.

"Westcott"—Every Time Any Pressure—All Styles



FURNISHED IN IRON BODY, BRASS MOUNTED AND SEMI-STEEL

"If CONTINENTAL Sells It There Is No Better"

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MORE THAN 70 STORES IN THE OIL COUNTRY

CONTINENTAL

BURNERS TESTED FOR DOMESTIC HEATING

(Continued from Page 93)

Baume gravity, down to and including any product which can be made liquid by steam heat.

The fuel oils used on the above tests are designated as Furnace Oil samples Nos. 3 and 4, and Distillate samples Nos. 2 and 3, analyses of which are shown in Figure 2. The gravities of the furnace oils as shown on the table range from 37.6 to 38.07 degrees Baume and the distillates from 32.04 to 33.93 degrees Baume. The terms as applied to fuel oils of these gravities may not be comparable to those applied to fuel oils of the same gravity in other sections and therefore attention should be directed to the gravities of the fuel oils referred to in this article rather than to the name applied to them.

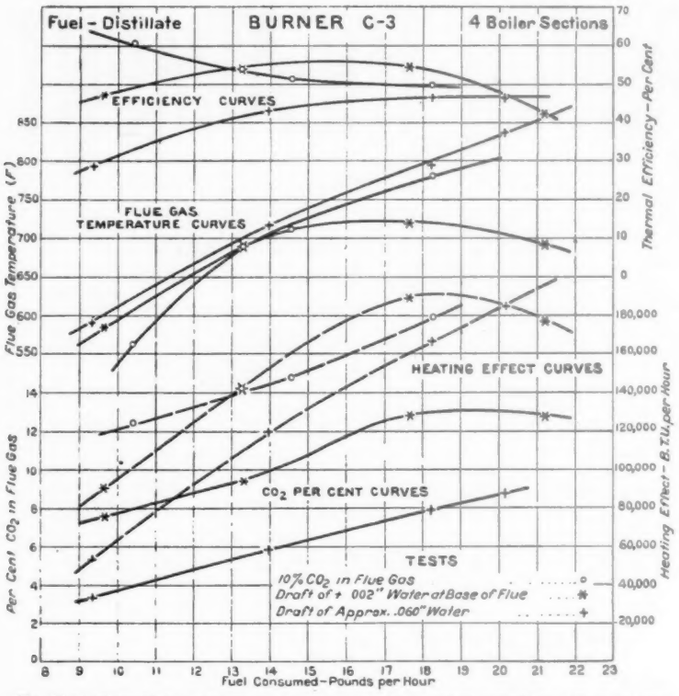
Fuel – Distillate
BURNER C-3
4 Boiler Sections
EFFICIENCY CURVES
FLUE GAS TEMPERATURE CURVES
HEATING EFFECT CURVES
CO2 PER CENT CURVES
TESTS
10% CO2 in Flue Gas
Draft of + .002" Water at Base of Flue
Draft of Approx. .060" Water
Flue Gas Temperature (F)
Per Cent CO2 in Flue Gas
Thermal Efficiency – Per Cent
Heating Effect – B.T.U. per Hour
Fuel Consumed – Pounds per Hour

Fig. 19—Performance of burner C. Tests made with constant conditions; boiler of four sections; fuel, distillate. Runs Nos. 454-464.

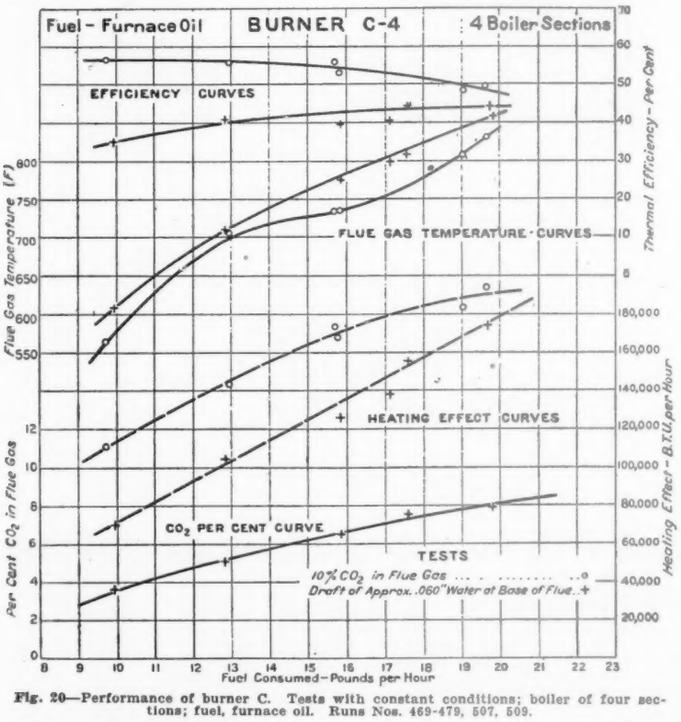
Fuel – Furnace Oil
BURNER C-4
4 Boiler Sections
EFFICIENCY CURVES
FLUE GAS TEMPERATURE CURVES
HEATING EFFECT CURVES
CO2 PER CENT CURVE
TESTS
10% CO2 in Flue Gas
Draft of Approx. .060" Water at Base of Flue
Flue Gas Temperature (F)
Per Cent CO2 in Flue Gas
Thermal Efficiency – Per Cent
Heating Effect – B.T.U. per Hour
Fuel Consumed – Pounds per Hour

Fig. 20—Performance of burner C. Tests with constant conditions; boiler of four sections; fuel, furnace oil. Runs Nos. 469-479, 507, 509.

Nomenclature

The tests here discussed were made on four well-known makes of power burners of the atomizing type; that is, they are burners which employ electric motors to subdivide and mix the oil with the air of combustion in counterdistinction to the so-called gravity type in which the oil is burned by vaporization from a hot surface. The burners will be referred to as A, B, C and D, respectively, and the reference letter appears on each table and curve sheet which applies to that particular burner. For example, Figure 11 is labeled A-1 which signifies that this figure is the first of the series of curves for the burner designated as A.

Tests Conducted

Let us consider first the tests made on burner designated as A. Two sizes of this particular burner were subjected to test, but the results will be referred to as those of one burner inasmuch as the design is substantially the same, the variation being made so as to accommodate the smaller boilers readily. However, it should be remembered that the larger size was tested in the larger boiler and the smaller size was tested in the smaller boiler. The tests were planned so as to bring out the performance of the burner when different conditions of operation were imposed upon it, such a number of boiler sections, kinds of fuel, air fuel-ratio, etc.

The groups of tests for burner A may be enumerated as follows:

1. Burner installed in 6-section boiler.
   A. Burning furnace oil.
      a. Series to give data for performance with constant CO_2 content in stack gases of 13.4 per cent.
      b. Series to give data for performance with constant CO_2 content in stack gases of 10 per cent.
      c. Series to give data for performances with stack damper removed.

This group of curves is plotted on Figure 11:

   B. Burning distillate fuel.
      a. Series to give data for performance with constant CO_2 content in stack gases of 10 per cent.

This curve is plotted on Figure 12:

II. Burner installed in 4-section boiler.
   A. Burning furnace oil.
      a. Series to give data for performance with constant CO_2 content in stack gases of 13 per cent.
      b. Series to give data for performance with constant CO_2 content in stack gases of 10 per cent.

This group of curves is plotted on Figure 13:

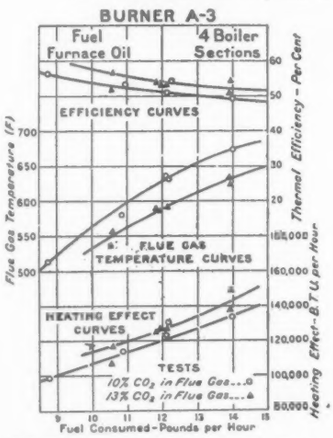

Fig. 13—Performance of burner A. Tests made with constant conditions; boiler of four sections; fuel, furnace oil. Runs Nos. 515-518, 520-525, 528-529.

Burner "B"

Next is burner designated as B. The one size of this burner was applicable to both the boilers tested and sufficient range was secured by adjustment of the fuel valve, etc. The groups of tests may be enumerated as follows:

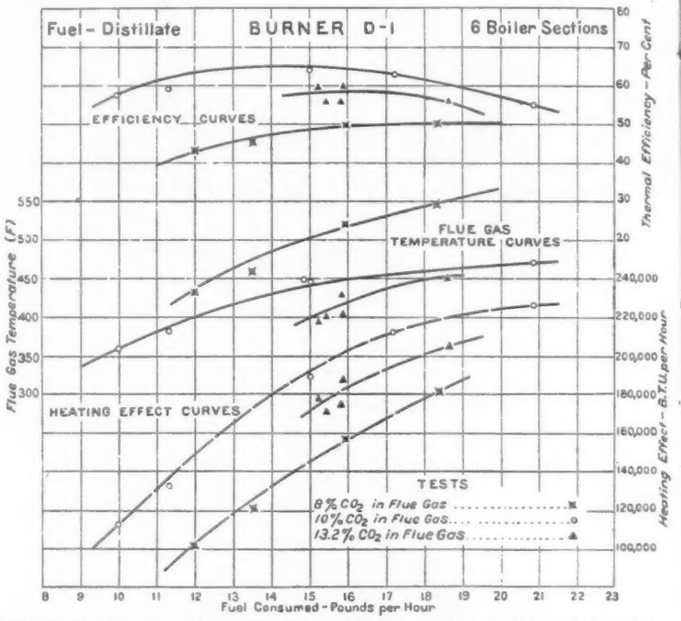

Fig. 21—Performance of burner D. Tests made with constant conditions; boiler of six sections; fuel, distillate. Runs Nos. 512, 513, 526, 527, 535-538, 541-546.

I. Burner installed in 5-section boiler.
   A. Burning distillate fuel.
      a. Series to give performance with constant CO_2 content in stack gases of 10 per cent.
      b. Series to give performance with constant CO_2 content in stack gases of 5 per cent.
      c. Series to give data for performance with constant draft intensity of +.002 inches of water at base of flue.
      d. Series to give data for performance with constant draft intensity of .070-inch of water at base of flue.

This group of curves is plotted on Figure 14:

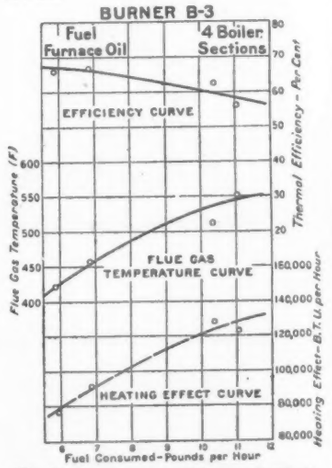

Fig. 16—Performance of burner B. Tests made with constant condition; 10 per cent CO_2 in flue gas; boiler of four sections; fuel, furnace oil. Runs 436-439.

II. Burner installed in 4-section boiler.
   A. Burning distillate fuel.
      a. Series to give data for performance with constant CO_2 content in stack gases of 5 per cent.
      b. Series to give data for perform-

ARMCO INGOT IRON

TRADE MARK

Resists the Gnawing of Distillates and Salt Water

Do you know the condition of the inside of your oil tanks? Not always is it easy to see just how serious the disintegration is, but the attack is going on all the time.

For instance, salt water eats into the bottom of the tank. At the same time the distillates are busily attacking the deck; while on the outside, moisture and air are promoting corrosion.

Obviously, a material that stands up under such combined attacks must be a rust-resisting material.

Such is ARMCO - Ingot Iron — the commercially pure iron.

Many oil producers have found ARMCO-Ingot Iron by far the most economical material to use for tanks, roofing, siding, smokestacks, wagon tanks, tubes, condenser boxes, culverts, flumes, barrels, lath, pipe, and fence.

Let us send you further evidences — the testimony of those who are using ARMCO-Ingot Iron—testimony from those who know.

THE AMERICAN ROLLING MILL CO.
Middletown, Ohio
Export: The ARMCO International Corp.
Cable Address: ARMCO, Middletown

ance with constant draft intensity of +.002-inch of water at base of flue.

c. Series to give data for performance with constant draft intensity of .070-inch of water at base of flue.

This group of curves is plotted on Figure 15:

B. Burning furnace oil.

a. Series to give data for performance with constant CO_2 content in stack gases of 10 per cent.

This curve is plotted on Figure 16:

Burner "C"

Burner designated as C was also installed in boilers of different numbers of sections and the tests were as follows:

I. Burner installed in 6-section boiler.

A. Burning distillate fuel.

a. Series to give data for performance with constant CO_2 content in stack gases of 10 per cent.

b. Series to give data for perform-

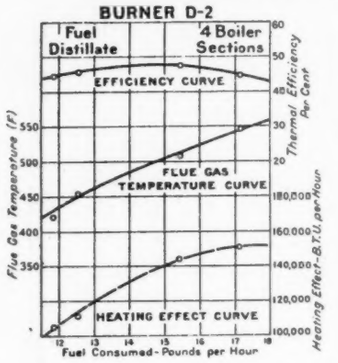

Fig. 22—Performance of burner D. Tests made with constant condition; 10 per cent CO_2 in flue gas; boiler of four sections; fuel, distillate. Runs 547-550.

ance with constant draft intensity of +0.002-inch of water at base of flue.

c. Series to give data for performance with constant draft intensity of .060-inch of water at base of flue.

This group of curves is plotted on Figure 17:

B. Burning furnace oil.

a. Series to give data for performance with constant CO_2 content in stack gases of 10 per cent.

b. Series to give data for performance with constant draft intensity of 0.060-inch of water at base of flue.

This group of curves is plotted on Figure 18:

II. Burner installed in 4-section boiler.

A. Burning distillate fuel.

a. Series to give data for performance with constant CO_2 content in stack gases of 10 per cent.

b. Series to give data for performance with constant draft intensity of +0.002-inch of water at base of flue.

c. Series to give data for performance with constant draft intensity of 0.060-inch of water at base of flue.

This group of curves is plotted on Figure 19:

B. Burning furnace oil.

a. Series to give data for performance with constant CO_2 content in stack gases of 10 per cent.

b. Series to give data for performance with constant draft intensity of 0.060-inch of water at base of flue.

This group of curves is plotted on Figure 20:

Burner "D"

The last is burner designated as D. The one size of this burner was installed in the two boilers of different numbers of sections. The tests were as follows:

I. Burner installed in 6-section boiler.

A. Burning distillate fuel.

a. Series to give data for performance with constant CO_2 content in stack gases of 13.2 per cent.

INVESTIGATION OF DOMESTIC OIL BURNERS—LOG OF TEST DATA FOR BURNER D—1925

TABLE 2-A

Item No.	ITEMS AND UNITS:						
1	Test number	547	548	549	550	551	552
2	Date	8-6-25	8-7-25	8-7-25	8-7-25	8-8-25	8-8-25
3	Duration of test—hours	1	1	1	1	1	1
4	Heater used, number of sections	4	4	4	4	4	4
5	Fuel, kind and sample number	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3	Dist. 3
	RATES—						
6	Fuel burned, pounds per hour	11.85	12.55	15.45	17.65	16.68	15.00
7	Fuel burned, gallons per hour	1.646	1.743	2.146	2.382	2.317	2.084
	DRAFT—						
8	Base of flue, inches of water	0.006	0.001	0.026	0.023	+0.001	+0.010
9	Combustion chamber, inches of water	0.014	0.011	0.027	0.020	0.008	0.002
10	Ash pit, inches of water	.....	.....	.....	.....	.....	.....
	TEMPERATURES—						
11	Cooling water outlet, T. C. No. 1	85	90	91	88	86	86
12	Cooling water inlet, T. C. No. 2	71	71	71	71	71	71
13	Tank water inlet, left, T. C. No. 3	135	150	165	161	162	166
14	Tank water inlet, right, T. C. No. 4	135	150	165	161	162	165
15	Water, top section of heater, T. C. No. 5	139	156	171	166	166	170
16	Tank water outlet, left, T. C. No. 6	108	122	133	128	128	133
17	Tank water outlet, right, T. C. No. 7	108	122	134	129	129	134
18	Water, boiler inlet, left, T. C. No. 8	108	124	136	131	130	136
19	Water, boiler inlet, right, T. C. No. 9	108	124	136	131	131	136
20	Ash pit surface, right, T. C. No. 10	149	133	194	220	138	216
21	Ash pit surface, left, T. C. No. 11	134	108	171	208	112	190
22	Surface firepot section, right, T. C. No. 12	99	107	122	120	114	120
23	Surface firepot section, left, T. C. No. 13	101	113	123	121	116	124
24	Surface shallow intermediate section, right, T. C. No. 14	133	145	159	157	156	160
25	Surface shallow intermediate section, left, T. C. No. 15	116	139	153	152	149	154
26	Surface, top section, right, T. C. No. 16	133	148	161	158	156	160
27	Surface, top section, left, T. C. No. 17	115	143	166	164	160	156
28	Surface, deep intermediate section, right, T. C. No. 18	.....	.....	.....	.....	.....	.....
29	Surface, deep intermediate section, left, T. C. No. 19	.....	.....	.....	.....	.....	.....
30	Fuel, T. C. No. 20	76	74	76	80	75	79
31	Surface smoke pipe, T. C. No. 21	189	212	227	242	227	224
32	Flue gas, T. C. No. 22	421	454	507	545	484	468
33	Air to ash pit, T. C. No. 23	88	86	96	103	87	101
	FLUE GAS ANALYSIS—						
34	Carbon dioxide, per cent by volume	10.1	10.1	9.7	9.9	13.3	13.5
35	Oxygen, per cent by volume	6.5	7.4	7.5	7.3	2.4	2.7
36	Carbon monoxide, per cent by volume	0.0	0.0	0.0	0.0	0.0	0.0
37	Nitrogen, per cent by volume (difference)	83.4	82.5	82.8	82.8	84.3	83.8
	PSYCHROMETER READINGS—						
38	Wet bulb	73	71	74	76	72	73
39	Dry bulb	76	74	76	80	75	79
	QUANTITIES—						
40	Cooling water passed through cooler, pounds per hour	4126	4349	6059	6605	7899	7789
	Heat in boiler and tank water:						
41	Beginning of test, B.t.u.	81060	111571	130363	117790	120233	132705
42	End of test, B.t.u.	127589	140970	153727	157037	152125	156062
43	Heat added to boiler and tank water, net B.t.u. per hour	46529	29399	23364	39247	31892	23357
44	Heat removed by cooling water, net B.t.u. per hour	57640	82457	120938	112021	118248	139891
45	Heat imparted to tank water, net B.t.u. per hour	104169	111856	144302	151267	150140	163248
	HEAT BALANCE PER POUND OF FUEL AS FIRED—						
46	Heat imparted to tank water, B.t.u.	8790	8913	9340	8820	9001	10883
47	Heat lost due to moisture content of fuel, B.t.u.	0	0	0	0	0	0
48	Heat lost due to water vapor formed in burning hydrogen, B.t.u.	1407	1429	1454	1470	1444	1430
49	Heat lost due to moisture in air used for combustion, B.t.u.	56	57	76	84	49	50
50	Heat carried away by dry chimney gases, B.t.u.	1725	1902	2241	2372	1571	1474
51	Heat lost by radiation from heater and smoke pipe, B.t.u.	257	288	333	340	247	357
52	Heat lost due to unconsumed gaseous combustible matter, B.t.u.	0	0	0	0	0	0
53	Heat lost due to unconsumed combustible in soot, B.t.u.						
54	Heat lost due to convection and unaccounted losses, B.t.u.	7486	7132	6277	6635	7409	5527
55	Total heat value of fuel as fired, B.t.u. per pound	19721	19721	19721	19721	19721	19721
	HEAT BALANCE, PER CENT HEAT IN FUEL AS FIRED—						
56	Heat imparted to tank water, (thermal efficiency) per cent	44.6	45.2	47.4	44.7	45.6	55.2
57	Heat lost due to moisture content of fuel, per cent	0.0	0.0	0.0	0.0	0.0	0.0
58	Heat lost due to water vapor formed in burning hydrogen, per cent	7.1	7.2	7.4	7.4	7.3	7.2
59	Heat lost due to moisture in air used for combustion, per cent	0.3	0.3	0.4	0.4	0.2	0.2
60	Heat carried away by dry chimney gases, per cent	8.7	9.6	11.4	12.0	8.0	7.5
61	Heat lost by radiation from heater and smoke pipe, per cent	1.3	1.5	1.7	1.7	1.2	1.8
62	Heat lost due to unconsumed gaseous combustible matter, per cent	0.0	0.0	0.0	0.0	0.0	0.0
63	Heat lost due to unconsumed combustible in soot, per cent						
64	Heat lost due to convection and unaccounted losses, per cent	38.0	36.2	31.7	33.8	37.7	28.1
65	Total heat value of fuel as fired, per pound	100.0	100.0	100.0	100.0	100.0	100.0
	ELECTRIC POWER, A. C.—						
	Watts	223	217	215	205	218	213

b. Series to give data for performance with constant CO_2 content

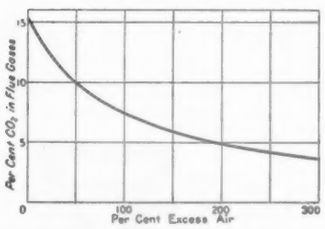

Fig. 23—Curve showing relation between excess fuel percentage and per cent CO_2 resulting from complete combustion of fuel with following analysis, by weight: Carbon, .8451; hydrogen, .1298; oxygen, .0099; nitrogen, .0099; sulphur, .0063.

in stack gases of 10 per cent.

c. Series to give data for performance with constant CO_2 content in stack gases of 8 per cent.

This group of curves is plotted on Figure 21:

II. Burner installed in 4-section boiler.

A. Burning distillate fuel.

a. Series to give performance with constant CO_2 content in stack gases of 10 per cent.

This series is plotted on Figure 22:

The data and results of tests on the burners are recorded on Figures 3 to 10, inclusive. The curves are plotted from the results recorded on these tables.

GASOLINE SUBSTITUTES GAIN IN EUROPE

(Continued from Page 142)

for Coal Research at Mulheim-Ruhr, show that fuel mixtures of higher heating value can also be synthesized from carbon monoxide and hydrogen. Fischer and associates have produced on a laboratory scale from water gas a mixture which they term "synthol" that consists of a mixture of alcohols, aldehydes and ketones with small quantities of hydrocarbons. Water gas plus hydrogen is subjected to a pressure of from 75 to 150 atmospheres at 400 to 425 degrees Centigrade in a steel reaction chamber containing a catlyst prepared from iron and a solution of sodium carbonate and consisting presumably of sodium ferrite. By-products of this reaction are carbon dioxide, methane and water. By recirculation of the gases, about one-third of the original water gas is converted into liquid products, having a distillation range similar to gasoline, and a heating value of 8,200 calories per kilogram. This process is yet in its early laboratory stages, but it indicates that further developments along this line may be expected, especially since other laboratories both in the United States and abroad are taking up research in this field.

Table 1—Analyses of Oil Fuels*

OILS—	Furnace Oil Sample No. 3	Furnace Oil Sample No. 4	Fuel Oil Distillate Sample No. 2	Fuel Oil Distillate Sample No. 3
Specific gravity at 60/60 Deg. F.	0.8353	0.833	0.8542	0.864
Degrees Baume	37.60	38.07	33.93	32.04
Flash point, deg. F. (closed cup)	155	155	192	179
Flash point, Deg. F. (Cleveland open cup)	170	165	200	190
Fire point, Deg. F. (Cleveland open cup)	175	175	210	235
Viscosity, Saybolt Universal, at 70 Deg. F.	42	43	48	54
Viscosity, Saybolt Universal, at 100 Deg. F.	40	42	44	47
Viscosity, Saybolt Universal, at 120 Deg. F.	38	41	40	43
Gallons per pound	.1437	.1441	.1405	.1389
Per cent of water	None	None	None	None
Color of oil	Yellow	Straw	Black	Black
Gross B.t.u. per pound	19,934.5	19,602	19,235.5	19.721
Proximate analyses:				
Volatile matter, per cent	99.923	99.995	99.988	99.95
Fixed carbon, per cent	0.067	0.005	0.012	0.05
Ash, per cent	None	None	None	None
Ultimate analyses:				
Carbon, per cent	83.39	83.54	84.27	84.51
Hydrogen, per cent	12.98	14.16	12.85	12.98
Sulphur, per cent	0.69	0.72	0.36	0.53
Oxygen and nitrogen, per cent	2.94	1.58	2.52	1.98

*Analyses made by the Engineering Experiment Station, U. S. Naval Academy.

EASTERN FIELDS

(Continued from Page 60)

on the William Riter farm and is also a light gasser.

In Union District, Clay County, far removed from the new Big Injun development on Granny Creek, Henry District, the Empire Petroleum Co. has completed and shot in the Big Injun sand a second test on the A. W. Moore farm. It is a gasser good for 200,000 feet. The location is 3,000 feet southwest of the same company's test on the King farm.

Gilmer County

On the waters of Tanners Run, DeKalb District, Gilmer County, Zinn & Co. have a light gasser in the Big Injun sand at a test on the Ada Hardman farm. On Little Grave Creek, Union District, Marshall County, the Spider Oil & Gas Co. has the rig completed for a test on the Anna Jocum farm. In Liberty District, the Manufacturers Light & Heat Co., on Fish Creek, has the rig completed for a test on the T. & S. Blake 15 acres.

On the waters of Big Scary Creek, Scott District, Putnam County, W. Va., the Charleston-Dunbar Natural Gas Co.

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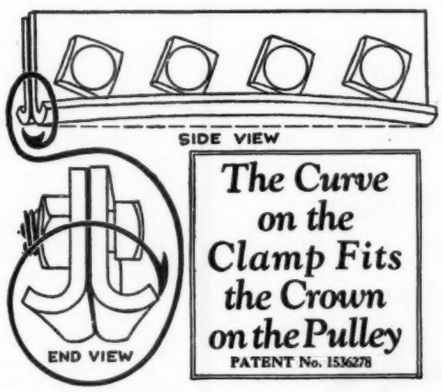

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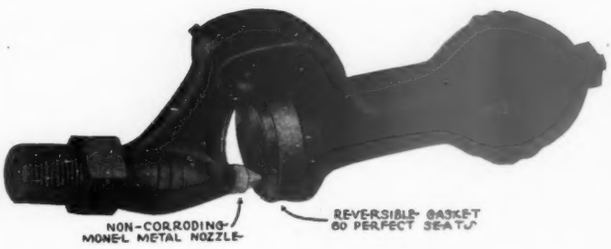

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The non-corrosive Monel Metal nozzle is always clean. When handle is released it drops down, the nozzle makes a quick, perfect seal on the gasket. No leakage—no spitting — a perfect steam-tight seat.

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has completed and shot in the Berea grit No. 3 on the Wirt Paul farm. It is a gasser good for 400,000 feet. On Poplar Fork, same district and county, the Teays Producing Co. has completed and shot in the salt a test on the A. B. Griffith farm and good for 10 bbls a day. On the same stream and district, 1,800 feet west of the test on the Eggleton farm, the Charleston-Dungar Natural Gas Co. has the rig completed and started to drill a test on the W. E. Wall farm.

On Middle Fork River, Union District, Ritchie County, the Pittsburg & West Virginia Gas Co. completed a test on the Harvey Vernon farm and showing for a 20-bbl. pumper in the Maxon sand. On Lambs Run, Murphy District, S. A. Powell & Co.'s test on the Kennedy heirs farm is a gasser in the Big Injun sand.

Marshall County

In Liberty District, Marshall County, the Manufacturers Light & Heat Co. has completed No. 4 on the Frank Quigley farm and is a gasser in the Gordon sand. In the same district, the same company has a good show of oil in the Big Dunkard sand on the William Meighan farm. In the same district, the Decem Development Co.'s test on the Robert M. Bonar farm, drilled down to the Gordon sand, filled up 2,000 feet with fluid the first five hours. It will make a good producer.

On Ragiens Run, McClelland District, Doddridge County, the Keystone Oil Co. of N. Y. has completed its test on the Mary Shrader farm good for 5 bbls. a day in the Big Injun sand. In DeKalb District, Gilmer County, A. E. Ellis & Co. are fishing for a string of tools at a test on the William J. Fling farm.

In Grant District, Harrison County, the Hope Natural Gas Co. has now drilled its test on the William Burnside farm through the Benson sand to a total depth of 4,081 feet. It is a gasser. In Harper District, Roane County, the Green Creek Oil & Gas Co. has a gasser in the Big Injun sand at a test on the William E. Fields farm. In Geary District, Ryan & Hogg have completed a second test on the S. V. Carper farm. It is a gasser in the Big Injun sand.

Tests Drilling and Starting

On the Henry Stursburg farm, Grant District, Ritchie County, Smith & Watterson are drilling at 800 feet at a test some distance in advance of production. In Clay District, Wetzel County, the Manufacturers Light & Heat Co. has rig material at a location for another test on the Thomas Little farm. In Curry District, Putnam County, the Grant Gas Co. is drilling at 2,700 feet on the W. H. Carpenter farm. In the same district, the same company has shut down on the Lee Dent heirs' farm. The Foote Oil & Gas Co. has shut down at 1,500 feet on the June Black farm.

Lincoln County

In Carroll District, Lincoln County, the W. C. Kingrey Gas Co. is due in the Berea grit on the Alexander Wheeler farm. In Sheridan District, the Maul Rock Oil & Gas Co. has started to drill on the J. M. Lucas farm. In Grant District, Cabell County, the Transylvania Petroleum Co. is drilling on the Smith farm. Burns, Lockwood & Sweetland are drilling on the Frank Fouble farm. In Barboursville District, Ortman & Shipe are building a rig on the M. E. & C. Merritt farm.

In Carroll District, Lincoln County, David Fox is drilling at 800 feet on the G. C. Gilleneater farm. In DeKalb District, Gilmer County, S. G. Roberts has started to drill on the Albert Beall farm. In Center District, the Hope Natural Gas Co. has rig material at a location on the L. D. Edwards farm. In Murphy District, Ritchie County, A. J. Kelly has started to drill on the W. H. Mosser farm. In Elk District, Harrison County, the Hope Natural Gas Co. has made a location on the Lucy McAndrews farm. In Grant District, the same company is drilling at 4,000 feet on the William Burnside farm. Operations have been delayed on account of a fishing job.

Southwest Pennsylvania

The offering of the southwest Pennsylvania fields at the close of the week consisted of gas wells, all in Greene County. In Gilmore Township, the Philadelphia Oil Co.'s second test on the John Wildman farm is a gasser in the fifth sand. In Springhill township, the Peoples Natural Gas Co. has a gasser in the Bayard sand at a test on the Sarah Minor farm. In Whitely township, the same company's test on the John Lantz farm is delayed with a fishing job. In Aleppo Township, the Manufacturers Light & Heat Co. is drilling a test on the Lucy McCracken farm. In Morris Township, the Carnegie Natural Gas Co. has drilled to a depth of 2,275 feet and shut down on the Caleb and Lyda Stewart farm.

During the early part of the week, in Morris Township, the Carnegie Natural Gas Co. got an 80-bbl. producer when it completed a second test on the W. L. Scott farm.

The Carnegie Natural Gas Co.'s No. 3 on the C. E. Day farm, in Morris Township, Greene County, is a gasser in the Gordon sand. In Springhill Township, the Peoples Natural Gas Co.'s test on the Ritchie-Cooper farm is dry in all sands.

Fair Producer in Morris Township

In Morris Township, Tague, Cummins & Co. have a 50-bbl. producer in the Gordon sand at a test on the C. H. Andrews farm.

Gasoline Station Burned

From some undetermined cause the South Penn Oil Co.'s gasoline station at Metz, Marion County, W. Va., caught fire and it and a small quantity of gasoline, was consumed. The amount of the loss was not given.

CENTRAL WEST

(Continued from Page 58)

800 from the west line of the George Birkhold 80 acres, in the west half of the northeast quarter of Section 17, Benton Township, Paulding County, in the heart of the Payne gas field, 2½ miles south and the same distance west of Payne. Top of sand was struck at 1,363 feet and at 36 feet in a nice gas volume was encountered with no oil showing. The third screw in the sand the volume of gas was 17,000 feet; fourth screw, 55,000 feet. fifth screw, 85,000 feet; sixth screw, 185,000 feet, measurement being taken by Galey Myers, one of the owners, and formerly with the Ohio Fuel Supply Co. The well was allowed to flow open for five days when it was given a shot of 80 quarts and 24 hours afterward was measured and showed an open flow of 1,021,280 feet, with 26 feet of gas sand. Gas production was contracted to the Payne Natural Gas Co. and being but 800 feet from the Payne gas line was hooked up and turned into the line. This is the first well of a series of six to be drilled on a block of 600 acres of leases. Of the Bailey Oil Co., Fred J. Estes is from Greenville, Ohio; Galey Myers of Coldwater, Ohio, and J. E. Bailey of Akron, Ohio.

The Payne gas field since the completion of the Birkhold farm well can be conservatively estimated to cover an area in excess of 3,000 acres and without a doubt is the biggest gas structure now known in the Trenton Rock Fields of Ohio and Indiana. Business men of Payne have begun a campaign to secure glass factories or manufacturing of any kind which wants a location where cheap fuel can be secured.

The Payne Natural Gas Co., owned by C. E. Ledford and John T. Schenck, is laying a 4-inch line into Payne from the gas field which is about completed. To show the appreciation of the citizens of Payne the town sent a message signed by a large number of citizens congratulating Mr. Ledford, who was spending the holidays at the home of his father and mother at Mt. Sterling, Ky. The message read:

"We extend the season's greetings and congratulations to you for creating the Payne Natural Gas Co. and its 100 per cent service. We predict when the system is completed it will be the greatest in magnitude and stability of any of its kind due to tremendous gas reserves of any system heretofore in Ohio.

"Signed: Mayor F. R. Lunn, Thomas Kneer, J. D. Lamb, Otto G. Henschen,

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Well Abandoned

E. A. Kuhns and others have pulled out and abandoned their old No. 1 on the J. W. Severns farm, Section 12, Union Township, Mercer County. It is rumored that leaseholders where wells have been producing for many years that have dropped to such a point that they are hardly worth the pumping, will be pulled out the coming spring, and the material found good utilized in further development work.

Indiana Field

The Indiana fields are in for a large number of advance tests, if the conditions warrant when the spring arrives so that material can be freighted to new locations. Not only the old Trenton Rock area in the eastern central portion of the State and the Princeton district in the southwestern portion, will be further tested but many counties that are virgin. The bulk of this work outside of the two present producing fields will be done in the south half of the State.

One of the newest wildcats to be started is located not more than 2 miles from the Indiana-Illinois State line. According to the Terre Haute Star, 75 oil leases have been filed in Vigo County, covering 7,000 acres in Sugar Creek and Prairieton Townships of that county, by Gilbert W. Gambill of Terre Haute. V. S. Welch and Thomas Flynn, both old-time operators of Robinson, Ill., now operating in New Mexico, are preparing to open what they hope will be a new oil field and one which, if opened, will be of great importance to Terre Haute. A derrick for the test is already on the ground northwest of the Dresden power plant and a quarter of a mile west of the Darwin road, the exact location being in the center of the northwest quarter of Section 11, Sugar Creek Township, on the Nattkemper farm, 4 miles south and approximately 5 miles west of Terre Haute and south of Clear Creek. The next few days will see the well drilling, the contractor being R. F. Shirliff of Robinson, Ill.

Mr. Gambill explained that surveys by oil experts and geologists showed that the Terre Haute sand could be "picked up" at a depth of approximately 1,800 feet. The old Prox well on North Ninth and One-Half Street in Terre Haute, which has been pumping for more than 30 years, is 1,606 feet deep and tests made by gelogists show this same sand can be found in the new area at a depth of 1,800 feet.

This big block of acreage was secured on the check of the coal veins on the holdings of the Walter Bledsoe Coal Co., for it is remembered that the "Shellburn Hole," one of the best producers in the Sullivan County Field, was struck by a check of the coal "holes" in that vicinity.

Daviess County

Daviess County, also in the southwestern part of the State, is to get a more thorough testing, especially in the Veale Township area, where some good producers were found during 1925. Martin & Dubois Counties will not be overlooked in the wildcat work of the new year, for both have produced small quantities of oil in the past. Martin County lies directly east of Daviess County and Dubois County just east of Pike County, in fact, the whole south half of the State from Indianapolis to the Ohio River will eventually be tested.

The only completion reported from Indiana during the week was a test well of the Murphy Oil Co. of Pennsylvania in the northwest quarter of the Edward Dorsen farm, in the northwest quarter of Section 20, Barton Township, Gibson County, which was pronounced a duster at a total depth of 1,360 feet.

The No. 4 well of A. B. Bement on the Claud Loveless farm, Lot 121, Clay Township, Pike County, that showed some gas at 1,340 feet will be drilled to a greater depth. The sand was found at 1,338 feet and the drill sent but 2 feet in.

In Maumee Township, Allen County, northeast of Fort Wayne, the Shuran Oil Co. is drilling No. 3 on the Gerber farm, Section 16, and now has five big tanks of crude in storage, awaiting shipment.

Illinois Field

Only one well of any value was found during the week in the Illinois Field, as no completions were reported from the Allendale Field of Wabash County. The well referred to was the best completed during the past several days in any part of the Central West Field, and was the Ohio Oil Co.'s No. 12 well, 250 feet from the south line and 620 from the east line of the C. J. Borden, Sr., farm, in the northeast quarter of Section 25, Dennison Township, Lawrence County, with a production of 50 bbls. from a depth of 1,475 feet, which is thought to be the Kirkwood formation, one of the stable producing sands of that county. In the same township, the International Oil & Gas Co. abandoned old No. 1 on the Alfred Vandermark farm, same section. In Lawrence Township, same county, the Ohio Oil Co. did the same with old No. 4 on the M. A. Lawson No. 2 farm, Section 18. In Petty Township, same county, the same company abandoned No. 1 C. S. Waggoner, Section 2; No. 2 Cassie Walters, Section 36; No. 4 Maria Ridgley, Section 12, and No. 6 H. D. Regal No. 2 farm, Section 35. The latter two were abandoned on account of going to salt water and the former two for going dry. Mahutska Oil Co. also abandoned Nos. 1 and 2 Mary Gowan, Section 25, and has abandoned the lease.

In Prairie Township, Crawford County, McNally & Starr's No. 6 well, 250 feet from the south line and 1,000 from the west line of the Amelia E. Joseph farm, Section 23, only produced 1 bbl. from a depth of 865 feet. This hole was drilled to a total depth of 1,115 feet and plugged back to the 865-foot point where the showing of oil was found.

In Sandoval Township, Marion County, the Ohio Oil Co.'s No. 8 well near the northwest corner of the F. M. Gunyon farm, Section 8, produced 2 bbls. at 1,553 feet.

A great deal of attention is being paid as the new year gets under way to the building of power plants in the Allendale Field of Wabash County. A number of plants are being erected on the various leases to take care of the pumping. Besides this there is a lot of new activity, and the year opens under the most promising auspices for a big period of development.

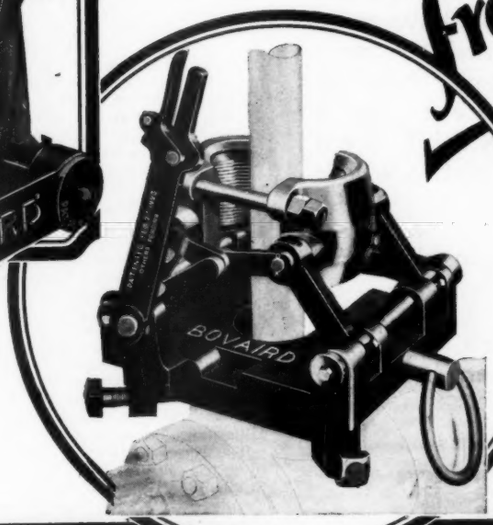
In the territory to the north of Allendale, there is considerable activity in outlying sections, including the drilling of a well on the John Enlow farm to the east of Mount Carmel; erection of rigs for tests on the Knox County, Indiana, side of the Wabash River; the well on the Tanguary farm, Section 7, Mount Carmel Township, Wabash County, northwest of Mount Carmel, and two wells drilling in Friendsville Township, same county, with lands under lease in all sections and plans laid for numerous other tests, even 50 to 60 miles south of Mount Carmel, in White, Edwards, Gallatin, Hardin and Pope Counties.

The major part of the activity, however, is to the north and northeast of Allendale, where the Stillwell Pool was opened last summer. New locations are being made and new rigs are being erected. At the same time the territory to the east and south of Allendale is now getting a number of tests and the gusher territory may continue in those directions as well as to the north. On the Mack Madden farm, Section 7, the Adams Corner Oil Co. is working at wells Nos. 6 and 7; Sargent, Hartman and others are drilling No. 4 and have rig for No. 5 up on the John Stillwell, Section 12, while the J. W. Price estate is getting a test by Ellison and others. Risley and others are drilling a test on the J. W. Price heirs farm, in the southwest quarter of the southwest quarter of Section 2, Wabash Township.

Central Ohio

Fifteen completions were reported from the Central Ohio Field for the week in review, of which one was an oil well with

Check your 1926 equipment from this list and you'll check all your 1926 elevator and spider trouble



THE BOVAIRD SUPPLY CO.
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A good name to tie to—
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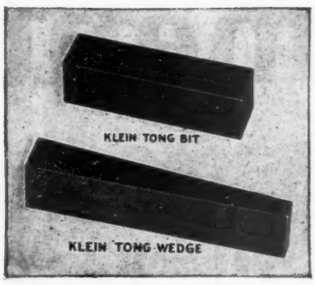
A whole lot depends on a little bit



WE make no special bits for TRANSIT Red Head Tongs.

All TRANSIT Tong Bits have to be made good, because any one might be assembled in a TRANSIT Red Head Tong, and the reputation of the whole tool would then be at stake.

We take no chances—we make them all good.

There are forty ways to cheapen these bits, but we know of no way to make them better.

TRANSIT Tong Bits

Special steel; cut from bar stock on an automatic machine to preserve the structure of the steel at the ends. Each bit is then accurately ground on all four sides. Result—four true and sharp edges.

In the hardening furnace, each bit is handled separately. After hardening, it is heat treated and the temper drawn to an exact and predetermined point.

NATIONAL TRANSIT
Pump & Machine Company
OIL CITY, PA.

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25 bbls. flush, 5 dry holes and 9 gas wells. There were four new locations staked out and three wells started drilling.

The wildcat well of the Upham Gas Co. on the George W. Criss 74 acres, in the northwest quarter of Section 4, Butler Township, Knox County, proved a duster. Top of Clinton found at 2,744 feet and total depth of hole was 2,795 feet, with no showing of either oil or gas.

In Orange Township, Ashland County, Hulse & Kundtz' test, 985 feet from the north line and 825 from the west line of the Dave Umbaugh 173 acres, Section 19, was a duster. In Mohican Township, same county, Burton, Morgan & Stephens' test on the M. H. and J. H. Slate 56 acres, Section 10, was also a rank duster.

Dillon & McFrederick Brothers' test in the southwest corner of the J. R. Mays 53 acres, Section 24, York Township, Medina County, is a very good gas producer.

The wildcat venture of the Edson Co., 300 feet from the south line and 1,300 from the east line of the J. Schmidtz 58 acres, Lot 3, Avon Township, Lorain County, proved a dry hole. In Columbia Township, same county, the Ohio Fuel Gas Co. drilled in three new gas wells, all being above the average producer. The best was the test in the southwest corner of the J. Wetzel 27 acres, Lot 27. No. 1 well, 1,400 feet from the north line and 300 from the west line of the Richard Putt 160 acres, Lot 29, and No. 3, in the northeast corner of the I. F. Ring farm, Lot 32, were the other two. The East Ohio Gas Co. made a location for a second test 600 feet from the south line and 300 from the east line of the W. W. Goodman 28 acres, Lot 34.

The Ohio Oil Co. has started a second test 300 feet from the north line and 950 from the east line of the L. N. and M. E. Martin 40 acres, Section 21, Wooster Township, Wayne County. In Congress Township, same county, Glen Harmon and others have a large gas well at a test 1,290 feet from the south line and 275 from the west line of the Clayton Harmon 44 acres, Section 36. In Cannan Township, same county, the Klise-Eckstein-McCann interests drilled in what is reported a 25-bbl. producer in a second test 300 feet from the south line and 600 feet from the west line of the Millard Fulton 55 acres, Section 36.

The Ohio Fuel Gas Co. drilled a duster in a test on the Emma Backus farm, Section 33, Benton Township, Hocking County.

Kemp and others' test, 700 feet from the north line and 529 from the east line of the J. N. Gaines 97 acres, Section 36, Troy Township, Athens County, is a light gasser. In Carthage Township, same county, the Logan Gas Co. hit a nice gas well at a test on the F. Cole 40 acres, Section 5. The Jay Oil & Gas Co. drilled a light gas well at No. 7 on the J. E. Bailey 180 acres, Section 5, drilling No. 8 and starting No. 9 same farm. McBride and others are drilling No. 3 Franklin Fair farm, Section 2.

The Logan Gas Co. is drilling a test in the northwest corner of the J. C. and Daisy Staats 113 acres, in Newcastle Township, Coshocton County.

A very light gas well was drilled by Hulse & Kundtz in a test in the center of the Della McKee 78 acres, Section 19, Richfield Township, Summitt County. The Ohio Oil Co. is starting the second test in the southwest corner of the C. E. Carpenter 100 acres, Lot 24, Monroe Township, Holmes County.

Michigan

The Saginaw Prospecting Co. has drilled in its No. 3 well, an offset to No. 2 in the North Saginaw area, and when shot may prove as productive as either of the two wells already under pump. It looks as though a field of prominence is being developed in Saginaw County. No. 4 well is drilling some distance from the three completed holes.

KENTUCKY-TENNESSEE

(Continued from Page 58)

ren County operator, on the Lewis farm between the Hall Baker and Emery-Moore Pools, was plugged at 587 feet, 150 feet below the shale.

Drilling Activities

Ziegler Bros.' No. 12 Drennon, spudding in; F. C. Moore's No. 13 McCubbin, rigging up; Ziegler Bros., Scott & Hice's No. 5 Bradford, drilling at 430 feet; Houchins Leasehold Co.'s No. 4 Trabue, going ahead at 512 feet; Russell Oil Co.'s No. 1 P. Page, drilling at 352 feet; Harrington & Norris Bros.' No. 2 Maddox Heirs, drilling in the sand; Wood Oil Co.'s No. 12 W. M. Church, cleaning out; Consolidated Gas Co.'s No. 9 Duff, is shut down with a fishing job; L. J. Emery, Jr., & Sons' No. 20 Deep-Greer, being placed on the power; Hiland Oil Co.'s No. 12 Cassidy, progressing at 225 feet; Esslinger Oil Co.'s No. 1 Glass, drilling at 458 feet.

Owensboro Field

The finding of a third pay sand in the Midkiff Pool, south of the Collier Station Pool, features the week in the Owensboro Field. This sand, the Jett, which lies between the stray and the Barlow sands, was found in the White Plains Oil & Gas Co.'s No. 1 John Ward, a mile north of the discovery well, and showed 5 bbls. production.

The Creek Drilling Co.'s No. 1 Dave King, in Daviess County, was barren in the Jett sand and was plugged. Pirtle & Smith's No. 3 Howard, in advance of the Collier Station Pool made 5 bbls. in the Jett sand at an approximate depth of 500 feet.

In the Pellville District, Pearl Stevens and others' initial venture on the G. V. Barlow, offsetting the J. O. Brown production, was dry and abandoned in the Barlow sand at about 754 feet.

Wells Drilling

Foster Oil Co. is having trouble in plugging its No. 1 R. B. Foster from the Barlow formation back to the Jett and where it will be shot; Joe Young's No. 1 Rhodes, drilling at 300 feet; Petroleum Exploration's No. 1 Henry Greer, spudding; Pennsylvania-Indiana Oil Syndicate's No. 1 Kelley, drilling at 320 feet; Bolling & Loman's No. 1 George Midkiff, spudding at 82 feet; White Plains Oil & Gas Co.'s No. 1 J. O. Brown is 16 feet in the Barlow sand with a good oil showing; C. A. Leeper's No. 5 J. S. Collier is showing fresh water in the Jett sand and will be plugged; Petroleum Extraction Co. is rigging up to drill on the Will Howard 130 acres adjoining the J. J. Midkiff to the north and northeast; Kentucky Oil Co.'s No. 2 John Burdette, drilling at 407 feet; Bert Thompson's No. 2 Gabbard, spudding in; L. A. Leeper's No. 7 Embert Barlow is down with a fishing job at 565 feet; White and Nicklin's No. 8 O. T. Burdette, drilling at 402 feet.

Warren and Allen Counties

Little of interest was shown in Warren or Allen Counties the past week and as a result few wells were finished.

In the Davenport Pool, the Cadet Oil & Gas Co.'s deep test on the Biddle farm was dry and plugged at 1,105 feet, 120 feet below the black shale. This was No. 24 on the Biddle place. Near the Stone Quarry, Cooksey and others' No. 1 Hayden was dry at 1,050 feet.

In Allen County, Lee Moore's No. 6 fee pumped 3 bbls. on power at 380 feet. This lease is in the famous Gainesville Pool.

MOVES OFFICES

The Twin State Oil Co. and the Sun Oil Co. have leased the fourth floor of the Petroleum Building, Tulsa, and will move in the near future from the building they have occupied at Sixth and Cheyenne Streets. That property is owned by the companies but it has not been decided as yet what disposition will be made of it.

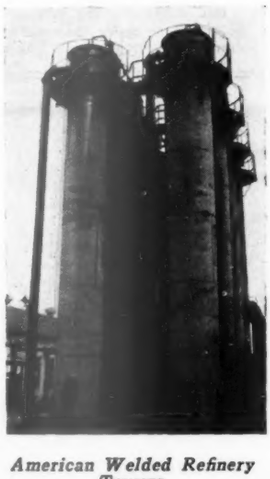
MOTORS IN SOUTH AFRICA

Imports of automobiles into South Africa during 1925 will approximate 16,500 cars, about 25 per cent more than in 1924, the Department of Commerce states. Of the total of 9,161 imported during the first half of 1925 the United States supplied 4,811.

Complete Tank Service for the Oil Industry

American Bolted Stock Tanks

American 5000-bbl. Bolted Pipe Line Tanks



American Welded Refinery Towers

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Jay Walker Oil and Gas Separators
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Absorber Towers, Agitators
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Horizontal Welded Storage Tanks
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DELIVERING:
Welded Truck Tanks
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Galvanized Underground Tanks
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MISCELLANEOUS:
Smoke Stacks, Bridge Tubes
Drive Casing, Tar Kettles
Dump Bodies and all sheet and Plate Steel Products.

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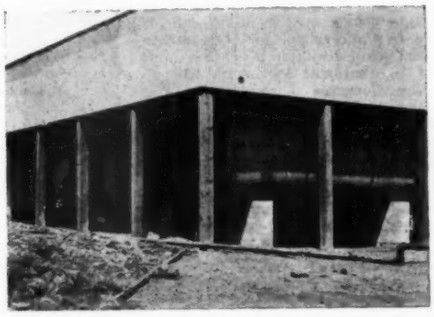


American Welded Casing Head Storage Tanks

American Jay Walker Gas Trap

AMERICAN TANKS

"Hold" AMERICAN TANK CO. TRADE Quality MARK WHOLESALE RETAIL "Gravity"

Portable Plants Give Satisfaction

Recent Natural Gasoline Installations in California and Mid-Continent Have Large Yields. Will Affect Design of Permanent Plants.

By C. O. Willson

With several installations already operating, and others contracted for, the portable absorption natural gasoline plant is receiving the consideration of practically all manufacturers. Although there is some disagreement among the operators as to just what part the portable plant is to play in the future production of natural gasoline, those who have given the new type equipment serious consideration are of the opinion that the innovation is a permanent contribution to the art of extracting gasoline from gas.

The portable plant was first developed in the California fields about six months ago. During the past two months it has spread to the Mid-Continent area, and announcement was made during the past week that an installation was to be made immediately in the West Virginia Field. The manufacturer of the first installation now has 23 units in operation, 5 being in the Mid-Continent and 18 in California. A second manufacturer, who displayed his first unit at the International Petroleum Exposition and Congress a month ago, has sold several of the plants.

Probably the most effective reply [illegible] can be made to those who are skeptical as to the value of the portable installations in natural gasoline manufacture is [illegible]ction is due entirely to the larger gasoline content of the Braman gas.

Resemble Permanent Plants

[illegible]rtable plants now available from manufacturers resemble so far as [illegible]l design is concerned the regular [illegible]anent installations which the com[illegible]anies manufacture. In fact, as one often times exceeds that spent in the absorbing, distillation and cooling units.

Need of Equipment

This situation naturally brings up the question as to just what need is there in the natural gasoline industry for the portable equipment. The writer has found general agreement among both the manufacturers of the equipment and the natural gasoline trade that the portable idea will never supplant the permanent plant around which the industry has had its remarkable growth during the past 15 years. A few at least are of the opinion that as fas as their own organizations are concerned that everything that is done by the portable units can be accomplished with permanent installations.

This situation, however, is apparently the exception, for a majority express the opinion that the portable plant has proved its worth and that, although the ble for a small organization to start in the manufacture of natural gasoline through the use of portable equipment

Uses

The first use for the portable plant is in the new field. Although the situation is much better than it was a few years ago, the opening up of new crude producing areas are, with rare exceptions, accompanied by a tremendous waste of casinghead gas, the raw material of the natural gasoline plant. The determination of the portable gas supply from a new area is just as hazardous as the probable crude production. The bringing in of a producing well in a new area may mean a pool of considerable size with a large gas output, but the opposite development is at least equally as probable.

In the past it has been customary for the natural gasoline manufacturer to wait several weeks or months until he could determine approximately what the new field would develop in the form of a permanent gas supply. In the meanwhile millions of feet of gas were wasted.

In most instances, situations of this character can be handled by the portable equipment. As soon as the first well is brought in the portable unit can be quickly moved to the lease, provided the gas flow is sufficient for commercial operation. In the areas where the natural gasoline production is the largest, the first wells have usually been accompanied by a heavy gas flow. Later, with the bringing in of additional wells, the gas flow per well decreases. Due to this fact the plant in a position to take the gas from the first three or four wells brought in might have as large a gas supply as the purchaser of the gas output of the first 30 or more wells.

Additional Units

Ordinarily the gas pressure in a new field will be more than sufficient to operate the low pressure absorbing units.

WHY A PORTABLE GASOLINE PLANT?

Many manufacturers of natural gasoline in all parts of the country are considering the advisability of adding portable distillations, absorbing and water cooling equipment to their facilities for the extraction of gasoline from gas. This general interest is apparent despite [illegible] first plant has only been in operation about [illegible]

Based on the success of the [illegible]ons which have been made up to the present time the portable equipment if generally used will mean a substantial increase in the production of natural gasoline from gas now wasted. It is also apparent that the innovation in manufacturing methods will bring about important changes in the operation of permanent plants.

Installed in a few days at relatively low cost in the new fields where it is impossible to determine just what the settled gas supply will be, the portable plants have shown a flexibility of operation and a gasoline recovery which compares favorably with larger permanent plants. Used to care for excess gas at the permanent plants the portable equipment has shown equally satisfactory results.

Protection for your portable equipment is furnished by Butler *Ready-Made* Steel Buildings. They fit right in with the idea of portable plants!

Butler Buildings are *ready-made*. They are standardized. They come in convenient 2-foot units. Similar parts interchange!

Why, your own employees can assemble them! Your employees can dismantle them, move them and re-erect them if you move your equipment. That is why Butler *Ready-Made* Steel Buildings are so adaptable to the needs of the oil industry. In actual everyday use, they prove their value.

They are strong as they are made of full 24-gage galvanized steel! The sheets are extra stiff because they have deeper and wider corrugations than usual!

The cost is attractive. Upkeep is reduced to a minimum. In addition, your fire risk is reduced! Butler Buildings are fire-proof, can be lined or insulated.

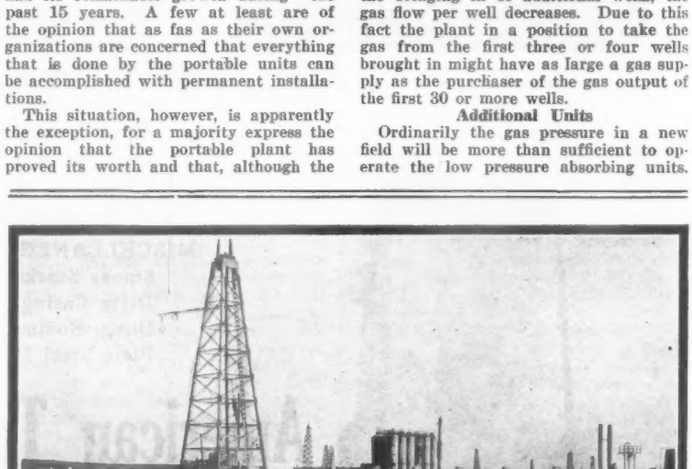
Here is a good feature to keep in mind: They can be enlarged economically.

FREE Building Catalog on request, or get in touch with our dealers.

These reliable dealers are ready to give you speedy service:

M & V Tank Co., at Wichita Falls, Vernon and Olney, Tex.
Drane-Humphrey Co., at San Angelo and Big Lake, Tex., and Carlsbad, N. M.
M. A. Trimmer, at Blackwell, Oklahoma.
Drane Tank Co., at Tulsa, Holdenville and Braman, Oklahoma, and Winfield, Kansas.
Wilson Tank & Culvert Co., at San Antonio, Texas.
D. H. Greenwood, 709 California Bldg., Los Angeles, California.
Continental Supply Co., at Kevin, Montana.
Petroleum Specialties Co., Casper, Wyo.
G. J. Gillespie, 32 Fenchurch St., London, E. C. 3, England.

TRADE STEEL PRODUCTS MARK



Butler Housing for Casing Head Gasoline Plant of One of the Larger Companies in the Oklahoma Field (34'x384').

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Butler Manufacturing Co.

Kansas City, Mo. Minneapolis, Minn.

MID-CONTINENT REFINERY RUNS INCREASE

(Continued from Page 38)

Independent Oil & Gas Co. (Allied), Okmulgee	1,800	1,200	1,200
Interocean Refining Co. (Lorraine), Bristow	4,000	1,200	1,200
Johnson Oil Refining Co., Cleveland	4,000	3,500	3,500
Lawton Refining Co., Lawton	1,000	Shut down	Shut down
Marland Refining Co., Ponca City	25,000	21,000	12,000
Mecca Refining Co., Allen	1,500	100	.....
Mid-Continent Petroleum Co. (Cosden), West Tulsa	35,000	26,000	26,500
*Miller Brothers 101 Ranch, Marland	100	100	.....
Newkirk Oil & Refining Co., Newkirk	2,000	Shut down	Shut down
Nyanza Refining Co., Wilson	3,500	Shut down	Shut down
Oil State Refining Co., Enid	2,000	Shut down	1,000
Okla.-Tex. Refining Co. (Sagamore), Grandfield	2,000	Shut down	Shut down
Phillips Co. (Waite), Okmulgee	6,000	3,900	5,000
Peppers Gasoline Co., Covington	1,000	750	750
Pierce Oil Corp., Sand Springs	10,000	7,000	6,000
Producers & Refiners Corp., West Tulsa	7,000	5,000	4,000
Producers & Refiners Corp., Blackwell	4,000	Shut down	Shut down
Pure Oil Co., Ardmore	6,500	1,530	2,000
Pure Oil Co., Cushing	5,000	Shut down	Shut down
Pure Oil Co., Muskogee, (O. P. & R. Co.)	2,500	2,000	2,000
Red Seal Refining Co., Oklahoma City	2,500	Shut down	Shut down
Riley Petroleum Co., Bristow	800	500	500
Rock Island Refining & Pipe Line Co., Duncan	2,500	1,800	1,850
Roland Oil Co., Bristow	1,500	550	600
Sayre Oil & Refining Co., Sayre	500	100	100
Shaffer Oil & Refining Co., Cushing	10,000	9,500	10,000
Sun Oil Co., Yale	3,000	2,500	2,500
Sinclair Refining Co., Cushing	6,000	Shut down	Shut down
Sinclair Refining Co., Muskogee	1,000	1,000	1,000
The Texas Co., West Tulsa	10,000	10,000	10,000
Texas Pacific Coal & Oil Co., Wynnewood	2,500	1,400	1,390
Tidal Refining Co., Drumright	6,500	5,000	6,000
Transcontinental Oil Co., Boynton	2,500	2,500	2,500
Transcontinental Oil Co., Bristow	6,000	5,000	5,000
Tonkawa Petroleum Co., Tonkawa	2,500	900	900
Western Oil Corp., Beckett	1,500	1,500	1,500
Yale Oil Corp., Yale	1,500	600	500
Total	273,100	170,130	163,880

*Average daily runs lower.

REFINING OPERATIONS IN NORTH CENTRAL TEXAS

(Plants which have been in operation during the past year.)

Name and Location—	Daily Capacity	Runs Jan. 1	Runs Dec. 1
Amarillo Refining Co., Amarillo	5,000	3,000	3,000
American Refining Co., Wichita Falls	7,000	4,600	4,800
Big Four Refining Co., Panhandle	1,500	1,000	1,000
Bridgeport Refining Co., Bridgeport	1,000	Shut down	Shut down
Buffalo Refining Co., Sherman	500	200	200
Col.Tex. Refining Co., Colorado	5,000	3,300	2,300
Crystal Petroleum Co., Burkburnett	1,000	250	250
Dale Oil & Refining Co. (Griswold), Electra	3,000	1,100	1,200
De Leon Refining & Pipe Line Co., De Leon	1,500	Shut down	Shut down
Falls Refining Co., Wichita Falls	1,500	1,000	500
Four States Refining Co., Texarkana	750	Shut down	Shut down
Gulf Refining Co., Fort Worth	15,000	6,400	6,400
Hagaman Refining Co., Tiffin	2,000	275	275
Humble Oil & Refining Co., Burkburnett	4,000	2,300	2,200
Humble Oil & Refining Co., Hearne	10,000	Shut down	Shut down
Iowa Park Producing & Refining Co., Iowa Park	2,500	1,500	1,200
Kent-Middleton Refining Co., Corsicana	2,500	950	800
Miller Petroleum Co., Wichita Falls	3,000	1,960	1,800
Magnolia Petroleum Co., Fort Worth	12,000	6,800	6,800
Magnolia Petroleum Co., Corsicana	10,000	2,800	2,800
Megargel Refining Co., Megargel	2,000	600	600
Mexia Oil & Refining Co., Mexia	600	Shut down	Shut down
National Refining Co., Texas, Greenville	2,000	Shut down	Shut down
Noble Oil & Gas Co., Burkburnett	5,000	2,700	2,700
Olney Oil & Refining Co., Olney	1,200	1,200	1,200
Oriental Refining Co., Dallas	6,000	200	200
*Oriental Refining Co. (Trinity), Dallas	5,000	3,000	3,000
Orient Petroleum Co., Wichita Falls	2,000	1,450	1,650
Paris Refining Co., Paris	250	250	250
Panhandle Refining Co., Wichita Falls	4,000	3,500	3,100
Peerless Refining Co., Wortham	400	300	350
The Petroleum Corp., Electra	2,000	Shut down	200
Primrose Refining Co., Wichita Falls	1,500	700	Shut down
Producers Refining Co., Gainesville	5,000	4,000	4,000
Simms Oil Co. (Clayton), Dallas	4,500	3,300	3,400
Star Refining & Producing Co., Fort Worth	1,500	650	Shut down
Sunshine Consolidated Oil Co., Wichita Falls	2,500	Shut down	1,400
Sweetwater Refining Co., Sweetwater	500	Shut down	100
Tidal Western Refining Co., Burkburnett	3,000	2,000	1,750
The Texas Co., Dallas	15,000	9,700	9,700
Texhoma Oil & Refining Co., Wichita Falls	7,000	4,500	4,500
Tiger Refining Co., Breckenridge	1,500	Shut down	Shut down
Transcontinental Oil Co., Fort Worth	5,000	2,750	2,750
Waggoner Refining Co., Electra	3,400	2,500	2,500
White Eagle Oil & Refining Co., Fort Worth	5,000	2,250	2,500
Wilson Brothers Refining Co. (Wichita Refinery) Wichita Falls	2,500	1,000	1,000
Total	177,100	83,925	82,375

*Operated by Magnolia Petroleum Co.

REFINING OPERATIONS IN KANSAS

(Plants which have been in operation during the past year.)

Name and Location—	Daily Capacity	Runs Jan. 1	Runs Dec. 1
Arkansas City Refining Co., Arkansas City	8,000	1,200	1,000
Commonwealth Oil & Refining Co., Moran	1,800	100	100
Derby Oil & Refining Co., Wichita	5,000	2,800	2,650
El Dorado Refining Co., El Dorado	3,500	2,500	2,500
Golden Rule Refining Co., Wichita	1,000	500	500
Grant Oil Co., Augusta	1,500	Shut down	Shut down
Kanotex Refining Co., Arkansas City	9,000	5,500	4,800
Kansas Oil Refining Co., Coffeyville	2,000	Shut down	Shut down
Kansas City Refining Co., Kansas City	5,000	3,700	4,000
Miller Petroleum Co., Humboldt	2,000	Shut down	Shut down
National Asphalt & Road Oil Co., Kansas City	400	Shut down	Shut down
National Refining Co., Coffeyville	6,000	6,000	6,000
Peerless Oil Refining Co., Chanute	3,000	2,000	2,000
Red Bird Refining Co., Fredonia	200	Shut down	Shut down
Roxana Petroleum Corp., Arkansas City	19,500	19,500	17,000
Sinclair Refining Co., Coffeyville	6,500	6,500	6,500
Sinclair Refining Co., Argentine	8,000	4,000	4,000
Skelly Oil Co., El Dorado	14,000	8,900	9,750
Standard Oil Co. of Kansas, Neodesha	12,000	11,000	8,000
United Oil & Refining Co., Hutchinson	2,500	Shut down	Shut down
Vickers Petroleum Co., Potwin	3,500	2,800	2,800
Waite Phillips Co., Wichita	5,000	2,400	3,350
West Kansas Refining Co., Russell	2,500	1,250	1,500
White Eagle Oil & Refining Co., Augusta	6,500	5,000	5,000
West Missouri Group—			
Interstate Refining Co., Centropolis	1,500	Shut down	Shut down
Wilhoit Refining Co., Joplin	1,500	800	800
Total	130,400	86,450	82,250

REFINING OPERATIONS IN NORTH LOUISIANA

(Plants which have been in operation during the past year.)

Name and Location—	Daily Capacity	Runs Jan. 1	Runs Dec. 1
Caddo Central Oil & Refining Co., Shreveport	3,500	2,500	2,500
Caddo Central Oil & Refining Co., Shreveport	5,000	5,000	5,000
Great Southern Refining Co., Ardis	2,000	1,000	500
Louisiana Oil Refining Corp., Shreveport and Bossier	15,000	12,000	12,000
Shreveport Producing & Refining Co., Shreveport	5,500	4,200	4,000
*The Texas Co., Ardis	7,000	6,000	6,000
Total	37,500	30,700	30,000

*Topping.

REFINING OPERATIONS IN ARKANSAS

(Plants which have been in operation during the past year.)

Name and Location—	Daily Capacity	Runs Jan. 1	Runs Dec. 1
Cross Refining Co., Smackover	2,500	2,000	2,300

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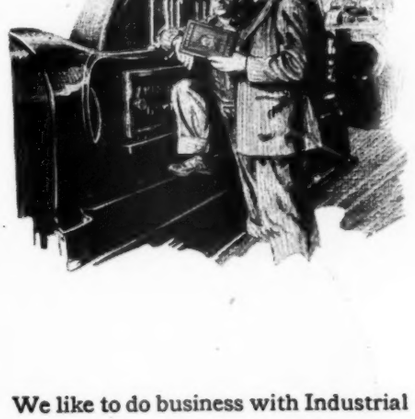

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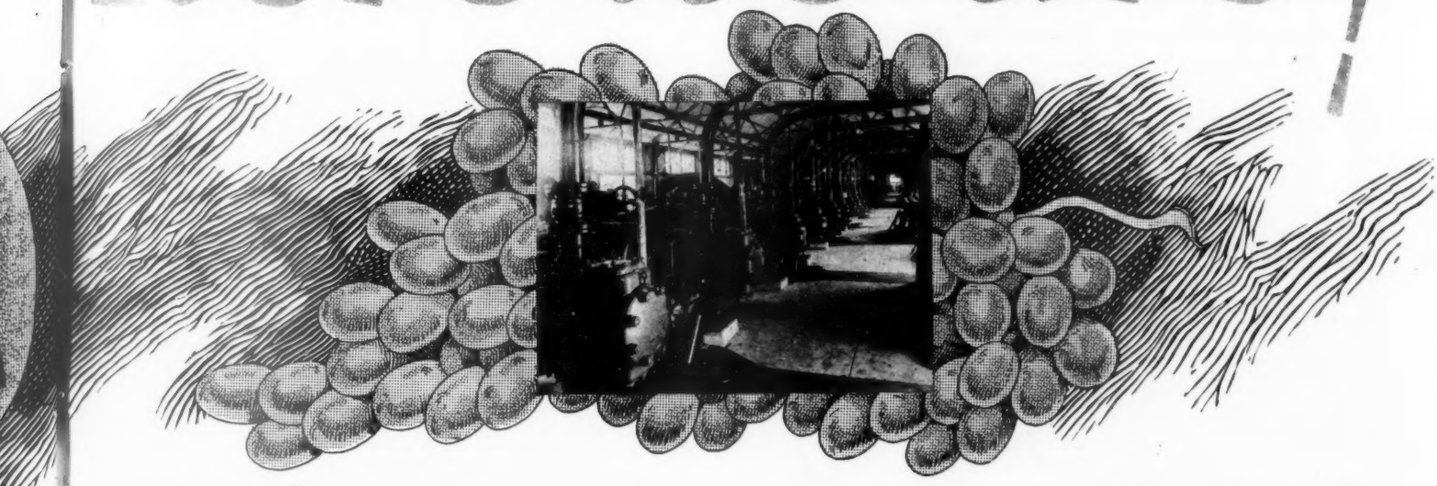

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Home Refining Co., Camden	500	75	100
Home Oil & Refining Co., Hot Springs	500	50	100
Houston Oil Co., Camden	5,000	1,800	1,750
Kettle Creek Refining Co., Pearson	4,000	2,900	2,500
Lion Oil & Refining Co., El Dorado	10,000	8,700	7,500
McMillan, Fehlman & Oliver, El Dorado	1,500	800	800
Ouachita Valley Refining Co., El Dorado	1,500	720	750
Pine Bluff Refining Co., Pine Bluff	2,000	Shut down	Shut down
Root Refineries, El Dorado	2,500	1,950	1,670
Total	30,000	19,995	17,470

WHY SOVIET SEEKS FOREIGN MARKET FOR RUSSIAN PETROLEUM PRODUCTS

Basic reasons which have compelled the Russian Soviet Government to seek foreign markets for its oil products on a large scale, and in so doing to come in conflict with the three leading factors in the European oil markets—the Royal Dutch-Shell combine, Ang'o-Persian Oil Co. and the Standard Oil Co.—have been set forth to Dow, Jones & Co. by a leading authority on the European oil situation.

First as an outgrowth of the war, Russia has changed from a country with an exportable surplus of several mil'ion tons of grain, to the position where practically the entire quantity is consumed by the peasants at home. Grain exports formerly supplied practically Russia's entire foreign currency requirements.

Oil Exports Increase

Second, by the creation of the Esthonian, Lithuanian and Finnish governments Russia lost the best of its factories. The revolution resulted in the disintegration of the Russian industrial and transportation machinery, reduction in locomotives to 5,000, from 27,000 before the war. Factories were destroyed, dismantled, or only partly operated and the fleet made a neg'igible factor, so that the consumption of fuel oil and lubricants has greatly decreased, while production of the Baku and Grozny oil fields has been increased, starting only three years ago, to a point where exports of oil in 1924 totaled about 1,500,000 tons. Before the war oil exports never exceeded 1,000,000 tons a year.

Even if a surplus of grain resulted from a bumper crop in Russia, the peasants' holdings are individually so small and scattered over such vast distances, with only a single-track railroad between Moscow and Vladivostok, that lack of transport facilities alone would prevent bringing any considerable quantities to the seaports.

The third and most important reason why Russia cannot export grain is that the peasant, who is the master in Russia today, will not part with his grain for Russian money. He wants goods, which the Bolsheviki do not have.

Foreign Currencies Needed

This being the case, the Soviet Government is compelled to find some other commodities which can be exported in exchange for foreign currencies.

One of the most important of these commodities is oil. Here Russia is in an excellent position. The Baku Field, producing oil rich in lubricants and fuel oil residues, and the Grozny Field, with its high naphtha content crude, are both near the seacoast on the Black Sea.

Before the war Russian oil producers did not need a foreign market, as they made all the money they wanted in Russia, with its large domestic consumption. When they did attempt to compete in foreign oil markets they met severe competition from the big oil companies and withdrew from the fight. Today conditions have changed. The Soviet Government is compelled to get foreign currencies and to secure European markets for its oil. The quality is fine and the fields are nearer to European markets than American or Persian oil fields. Certain markets are the natural markets for Russian oil products.

The entering wedge for Russian oil products was the contract concluded in April, 1923, by Sir Henri Deterding, managing director of the Royal Dutch-Shell group, for purchase of 200,000 tons of Russian oil products. This purchase was much criticized at the time, and was explained by official statement at the annual meeting of the company on the grounds that the oil was very cheap and its removal from the market was desired as it was a disturbing influence. This contract was followed by the French Government purchasing from the Soviet 85,000 tons of oil. Contracts were made by the Italian Government and an independent French group as well as the German combine and other companies have since followed.

Before purchasing oil from the Soviet, Sir Henri Deterding is understood to have endeavored to get possession of a'l the claims to Russian oil fields and plants, including a pipe manufactur'ng plant, with the idea of subsequently making the Soviet an offer for the entire Russian oil fields. He is reported to have stated: "I am going to take over a'l the oil fields of Russia and will give everybody fair compensation for the loss of former properties." When the Spies Petroleum Co. Baku Oilfields, and others interested asked "Suppose we do not agree with your fairness?" he is said to have retorted: "Then we wi'l have to send you to the Soviet Government, and they will use against you the law of nationalization."

British Owners Protest

This revelation is made as a result of Sir Henri Deterding's criticism of the "dishonesty of purchasing stolen Russian oil products" which has appeared in the British press. The objections to the Soviet sales of oil in Great Britain through the company formed on August 23, 1924, known as "Russian Oil Products, Ltd.," have been printed in pamphlet form by the Association of British Creditors of Russia, which points out that the Russian Oil Products, Ltd., began to distribute its "R. O. P." petrol in lilac cans, and other oil products, by undercutting the legitimate distributors of these products. Their ability to do this is explained as follows:

"1. By confiscating British and other properties in Russia, the Soviet Government has acquired oil land upon which the British and other investors have expended enormous sums.

"2. By expropriating all the equipment, the latest types of machinery, including electric power stations, incidental to the working of modern oil fields and refineries, the Soviet Government has saved the huge amounts which would be required for this purpose.

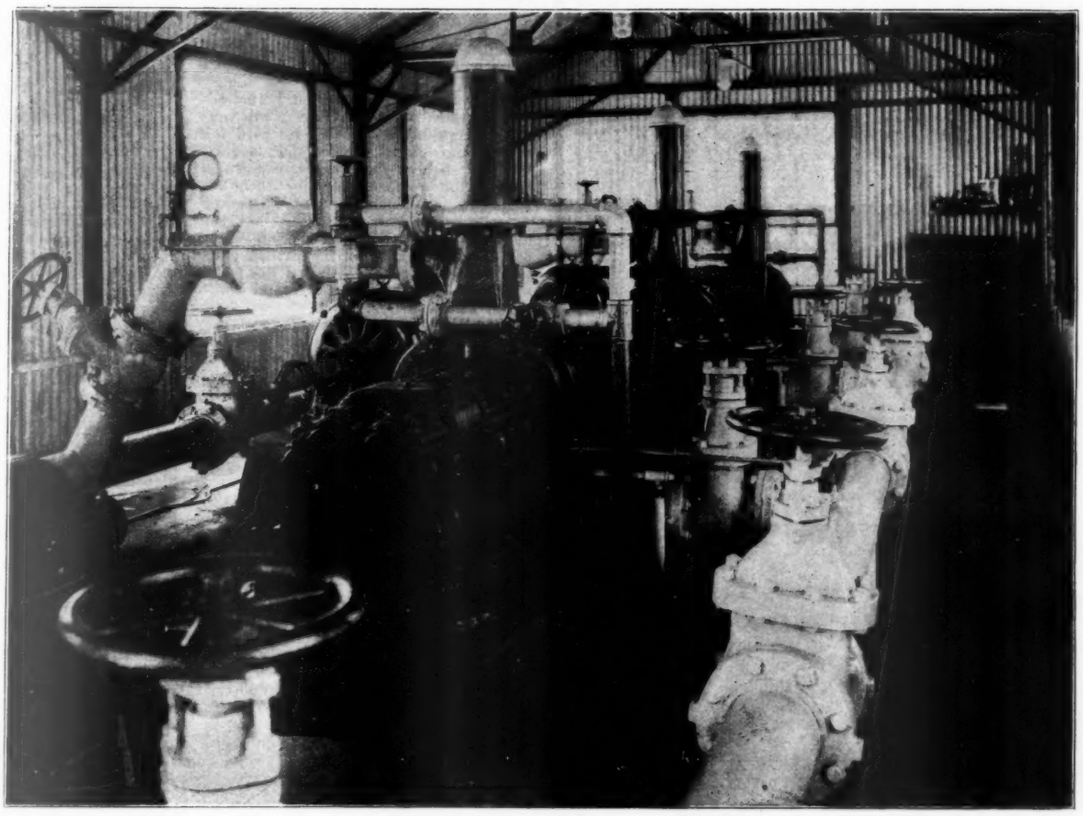
"3. By annexing vast stocks of oil, together with the reservoirs containing them, the Soviet Government had at its immediate disposal large quantities of oil entirely free of charge.

"4. By succeeding to flowing wells of petroleum, no expenditure was necessary to add to the existing stocks.

"The combination of these facts provided the Soviet Government with oil on which the production charges, so far as the Soviet was concerned, either did not exist at all or were infinitesimal. Free from the cost of exploration, survey and land leases, free from all capital outlays on construction, boring and general development, Soviet oil can be sold at any price. Added to this the low wages paid to oil field workers in paper currency printed by the Soviet Government, which apply as well to both railway and pipe line workers, it follows that only when the oil is pumped into the tank steamer are the Soviets faced with real economic conditions and real costs begin."

The Association of British Creditors of Russia advocates the appointment of a committee by the Government to examine and amend the Anglo-Russian Trade Agreemant of 1921, and to make

ROOTS



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it impossible for "products derived from stolen properties and subsidized by slave labor" to be brought into Great Britain to compete with goods produced by honest and legitimate means.

Soviet May Compensate Former Owners

As to whether the Soviet Government is likely to come to an agreement with former owners of Russian properties, this authority points out it concluded with Harriman & Co. an agreement which included compensation, and made certain concessions to the timber trade and paid compensation. The Soviet Government has declared it will consider compensation, and in its need for money may go to considerable lengths, but the chances for English companies getting full compensation for their oil properties are smaller than those of Americans, because the Soviet has set up a counterclaim for destruction of oil fields and properties by the British military forces, besides which the Shell Co. bought up a lot of claims since the revolution at low prices.

Confronted by the antagonism of the Royal Dutch-Shell combine and the Anglo-Persian Oil Co., which have ample supplies of crude oil for their European markets, the Soviet Government, which will apparently be an increasingly large factor in the European oil trade, must either build up its own distributing and marketing organization, or make some mutually advantageous arrangement with the Standard Oil group. This already has an efficient distributing system, but is a long way from its base of supplies, and in the event of a decline in American production to a point warranting an export embargo would need to have recourse to other large crude oil supplies which could be obtained on terms permitting competition with strongly entrenched organizations. Such a situation holds the prospects of a price war between the giants of the oil industry, or an agreement by which European marketing territories are divided among them in accordance with geographical bases of supplies.

OPERATING RECORDS IN CALIFORNIA FIELD

The Standard Oil Co. of California added more to its production than any other operator in that State because of its good fortune in getting the lion's share of the Inglewood Field. According to official figures, the Standard during 1925 completed 167 new wells, getting a total initial output of 74,795 bbls. per day. This figure represents flush production, and does not deal with the settled output obtained by the Standard in its new completions for the year. It completed 62 wells in the Inglewood Field, with an initial output of 60,683 bbls., which has since settled to about 28,500 bbls. per day.

Because of its large holdings in the Rosecrans Field, where it is the principal operator, the Union Oil Co. ran the Standard a close second in number of completions, and new production.

According to official figures, the Union finished and placed on production during 1925 45 wells, with an aggregate output of about 45,000 bbls. a day initial production. This figure includes the Union's operations in Colorado, where three wells were finished with a combined output of 2,000 bbls. Practically half of these wells were completed in the Rosecrans Field, where 20 wells were finished with a flush production of 27,000 bbls. of the highest gravity oil in the State.

The Marine Corp. probably was the outstanding organization among the smaller operators, its production at the end of the year totaling 8,800 bbls. of which about 2,000 bbls. was new production, brought in during the year.

Marine completed 10 wells, all in the Rosecrans Field, during 1925, with an initial daily output of 5,000 bbls. The company is getting about 6,700 bbls. a day from its Signal Hill wells, 2,000 bbls. from Rosecrans and 100 bbls. from Torrance.

Probably the outstanding mechanical achievement of the year was the drilling and completion of the deepest well in the world by E. J. Miley in the Athens area at Rosecrans.

Miley's Athens No. 6 was drilled to 7,600 feet, and it holds practically all the world records for drilling. It is the deepest hole in the world, the deepest producing well in the world, has the deepest known oil sand in the world, landed the longest string of casing in the world and made the deepest successful water shut off in the world.

LONG BEACH GETS $4,000,000 FROM OIL

LOS ANGELES, Calif., Jan. 9.—At the close of the fiscal year, June 30, the city of Long Beach will have taken in $4,202,187 in oil royalties from its lands on Signal Hill, according to estimates made by Terry Carpenter, city accountant of Long Beach, who estimates that the city's oil royalties for the fiscal year will amount to fully $1,000,000. Previous to the current year the city had collected $3,202,187 from its oil.

It is not improbable, petroleum engineers say, that Long Beach will ultimately collect from $8,000,000 to $10,000,000 in oil royalties and still own an immense acreage which is growing more valuable each year.

Long Beach city owns and has leased to oil companies 188 acres of land on Signal Hill. The defined producing area of the field is said to embrace about 1,100 acres so that the municipality owns approximately one-sixth of the field.

The Jergins Trust is developing 140 acres of the city's land, and turning over to the city 40 per cent of all oil production. The Ramsey interests are developing 37 acres on the same basis.

Long Beach acquired this oil land in 1911 when, as a municipality, it voted bonds with which to buy up several water companies and establish a municipal water system. After buying these systems the city went out in search of locations suitable for water storage reservoirs. It seemed wise to put these on the heights, to obtain greater pressure, so the city obtained several large tracts on Signal Hill, which was then chiefly a maze of Japanese vegetable gardens.

At that time there was no thought of oil on Signal Hill. The city went ahead with plans for its reservoirs. Oil was discovered there in 1921. The discovery well was directly across the street from 2 acres owned by the city. Oil development has not seriously handicapped the city in carrying out its plans for water reservoirs. Its water supply has not been interfered with in any way by extensive oil development on the hill.

PURE-PRAIRIE SALE TURNS OIL TO CAPITAL

NEW YORK, Jan. 9.—The new contract made by the Pure Oil Co. with Prairie Pipe Line Co., effective January 1, which involved the sale of a half interest in the Pure Oil Pipe Line Co. of Texas to Prairie Pipe Line, virtually releases about $8,000,000 of Pure Oil Co.'s working capital now represented by crude oil in storage.

The contract also contained a guaranty by Prairie to furnish Pure Oil with a minimum of 15,000 bbls. daily and a maximum of 20,000 bbls. whenever demanded, or enough to take care of requirements of Pure Oil refineries in excess of its own Mid-Continent production. Pure Oil has in storage in Texas 5,000,000 bbls. of crude, to protect its refinery supply. This stock has not previously been drawn upon.

NEW TIDAL COMPTROLLER

S. H. C. Walpole, of the New York offices of the Tidal Oil Co., has been elected comptroller of the Tidal companies and has arrived in Tulsa to take up his new duties. Mr. Walpole has been connected with the Tidal Oil Co. and its subsidiaries in its eastern headquarters for several years, having been assistant chief in the tax department. He succeeds W. K. Cotterell, resigned.

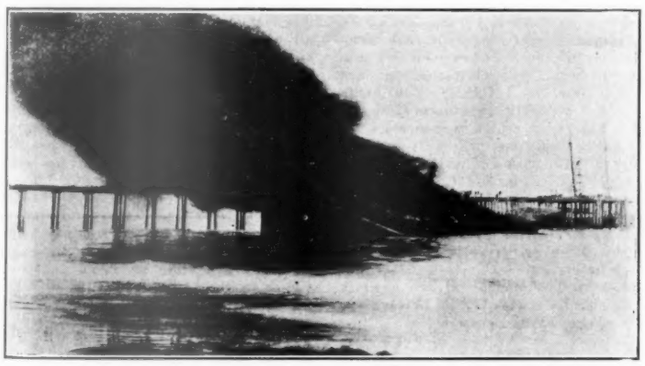
OIL PIONEERING IN CALIFORNIA

(Continued from Page 79)

drilled a well in Section 30-26-21 in the early summer of 1910. Oil was picked up rather unexpectedly while the hole, drilled with a portable rig, was being put down in search of fresh water for cattle. The bit penetrated an oil-bearing stratum at 472 feet and this cow pasture became an oil field.

The Universal Consolidated Oil Co. shortly after obtained a large part of the extensive holdings of Dudley, who was unfamiliar with oil production and financially unable to take advantage of the discovery made. No. 1 Lakeview of the Union came in about this time and the abundance of oil, no doubt, had a good deal to do with the sale of Dudley's holdings to the Universal. The Associated, Standard, General Petroleum, California Star and others followed the Universal, either leasing oil rights or buying the properties in fee. This was really the birth of the General Petroleum Corp. Numerous wells were drilled shortly after the discovery and the productive limits of the field was defined by a narrow strip of land along the ridge. Considerable exploratory work was undertaken in the area immediately east of Lost Hills but this extensive drilling was unsuccessful in developing any further productive land. Wells were also drilled along the northwest and southeast continuation of the structure and, although the productive limits of the field have been clearly defined, some new wildcatting and deep tests are again being put down.

Most of the oil from this field comes from beds of the McKittrick formation, directly overlying the Maricopa shale, which is supposed to have been the original source of the oil. The quality differs according to the distance above the shale, the lightest oil coming from the beds close to the shale near the axis of the anticline and the heavy from the upper beds and those further from the axis. In the southern part of the field the oil ranges from 30 degrees to 38 degrees A. P. I., whereas further north oil from 15 to 30 degrees is obtained from the upper sand. At the present time a great number of the wells are operated from central power plants, the lifting cost varying between 20 and 35 cents per barrel.



Burning of Tanker W. L. Hardison at Ventura Wharf, 1889. This was the first tanker put into service on the Pacific Coast. It burned in 1889 while standing at the Union wharf at Ventura. Capacity, 6,500 bbls.

Belridge

The Belridge Field covers a rather irregular strip of land trending northwest and southeast and in this respect is not unlike most of the other California districts. The field is about 5 miles in length and three-quarter sof a mile in width, there being approximately 3,000 acres of proven oil land. Belridge is 40 miles west of Bakersfield, 10 miles northwest of McKittrick and lies in the borders of the great flat northeast of the Central Temblor Range.

In a great many instances geological reports covering preliminary work with respect to oil possibilities in Kern County have resulted in the finding of oil when properly prospected, but unlike the other present producing areas, Belridge has no outstanding features and hence was not discovered until 1911, fully a year after the Lost Hills Field was opened up. The discovery hole was drilled near an outcrop of sand in a shallow wash. This particular outcrop has all the outward appearances of a dry weathered oil sand, but an anlysis did not reveal even a trace of oil.

The discovery well, No. 101, in Section 33, was drilled by the Belridge Oil Co. and to this concern is accredited the discovery of the field. The initial producer was a comparatively shallow one completed at 782 feet on April 21, 1911, and had a first production of 100 bbls., the oil testing 25.3 degrees in gravity. This producer experienced a long life and, although the gravity of the oil dropped somewhat, it was good for 50 bbls. a day for a long time. Extensive development followed the bringing in of this well and continued intermittently until 1915, up to which time most of the present wells in the northern part of the area were drilled. Drilling ceased at this time for about two years but intensive work was undertaken in the southern part of the field and continued through 1918 and 1919, at which time drilling again slumped off.

Many Wells Shut Down

The General Petroleum, Belridge and Bear State Oil Companies control the majority of the productive acreage but many of their producing wells are still shut down due to the heavy production in other areas. A great many of the wells drilled at Belridge were put down with cable tools, although a number have been drilled with combination, rotary and cable tools. This consisted of converting the cable tool equipment to rotary by rigging up a chain drive from the bandwheel to a rotary table. After the first water string was set, the well was completed with cable tools. Production is secured anywhere from 700 feet to 4,650 feet. In this area, as is the custom at Lost Hills, a great majority of the wells are pumped by a system of jack plant units. As many as 28 wells are pumped from one central power plant, which may be at a maximum distance of 2,000 feet from the well it pumps. The wells from which the engine houses and machinery have been entirely removed are pulled by portable pulling equipment mounted on auto trucks. Practically all of the wells make more or less sand with the oil, but this sand production usually decreases until in some of the older wells it is quite negligible.

The field production varies greatly and may be anywhere from 1 to 125 bbls. of oil daily per well. The average, however, is approximately 15 bbls. per day. The gravity of the oil is as variable as the production, ranging anywhere from 10 to 33 degrees. In the northern part of the area production tests about 23 degrees, while in the southern part the oil is around 15 degrees, a fair average for the entire field being about 20 degrees A. P. I. Over half of the producers make more or less water, generally from 2 to 10 bbls. a day. However, some make considerably more than this. A large part of this water is apparently from above the oil sand, although edgewater is encroaching in the top members of

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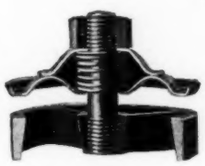

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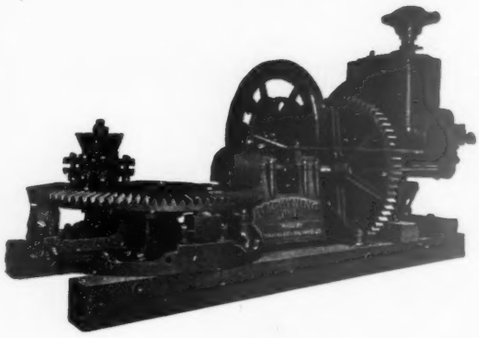

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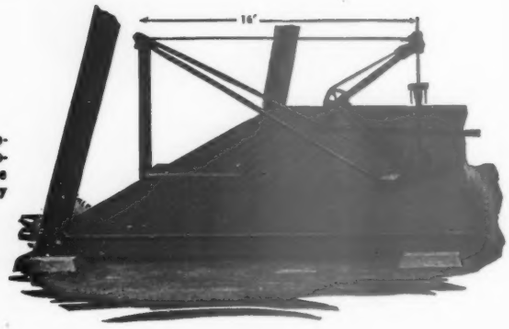

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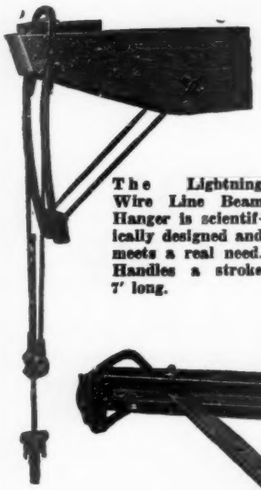

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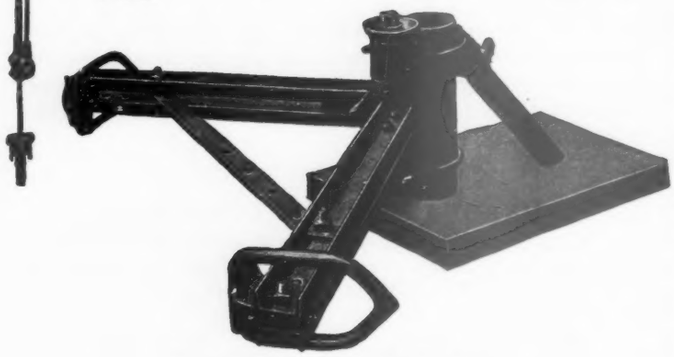

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the upper zone in the southern part of the field. The northern part of the field produces more water than the southern and, since edgewater has not yet made its appearance at this point, the heavy cut is attributed to the fact that more careful consideration of water problems was given in the drilling of holes in the southern part of the district.

Belridge has furnished many interesting stories from time to time and, although there are no particular drilling difficulties, cases have been reported occasionally of oil strings breaking off and shifting out of reach of tools. No doubt the production of sand creates a cavity below some rigid shale member and then an occasional cavein, due to this undermining action, is of sufficient force to shear the casing off at a point where it is held firm by the rigid shale member and carry it to the far side of the cavity. This explanation of lost tubing and casing is more plausible than that of shifting sands. Considerable gas is produced and the pressures in some wells have resulted in damaging blowouts. The top and contact zone wells originally produced large amounts of gas but at present the quantity is just about sufficient for pumping and lease requirements.

Elk Hills

The name Elk Hills is given to the highest range of hills between the Temblor Mountains and the San Joaquin Valley. The maximum elevation of the range, about 1,550 feet above sea level, or 1,250 feet above the San Joaquin Valley floor to the north, is reached in Section 28-30-23 M.D.B. & M. Early development in this field was greatly retarded by the United States Government petroleum withdrawals in 1908 and 1910 and subsequent litigation. The placing of a large portion of the potential oil territory in Naval Reserve No. 1 has since that time restrained maximum development activities.

The Elk Hills Field showed its first production in January, 1919, following an unsuccessful quest by the Associated a year or two previous. The real development of the field, however, was begun in September, 1918, when the Standard began drilling No. 1 Hay, Section 36-30-23, in the westerly portion of the district. This well, which was not an exceptionally large one, was completed in January, 1919, with an initial daily production of 225 bbls. of 36.8 gravity oil and no water. The Hay lease is practically in the center of Naval Petroleum Reserve No. 1 but, being privately owned, was not subject to President Taft's withdrawal orders.

The first development in the easterly portion of the field began in October, 1919, when the Standard began drilling No. 1 Tupman on Section 36-30-24 M.D. B. & M. This well was completed in February, 1920, with an initial daily production of 5,200 bbls. of clean 25.4 gravity oil. This big well on the Tupman lease just outside Naval Reserve No. 1 resulted in considerable new work by the Standard and Pacific Oil Companies who drilled along the eastern boundary of the reserve and their efforts were handsomely rewarded. The Tupman property has proven the most productive in the field, yielding many large oil and gas wells during 1920 and 1921 especially. The Union, Associated, Pacific, Pan American, Belridge and Standard Oil Companies are the only concerns to develop commercial production to date. The latter controls the most productive acreage through leases secured from private individuals and its withdrawals are nearly one-half the total amount of oil taken out of the field to date.

The development of this field has been almost exclusively by the rotary method. The comparative simplicity of the structure and softness of the formations make the field almost ideal for the rotary method. In one known instance 1,400 feet of rotary hole was made in less than two days. This field, which contains two distinct pools, due to careful drilling and commendable cooperation between representatives of the various companies operating in the district, has a remarkable record for production of clean oil. Notwithstanding the fact that 70,363,763 bbls. of crude have been produced since the original completion, it has only been during the past year or so that any amount of water has been produced. The peak of production at Elk Hills was reached in March, 1921, during which month 1,850,000 bbls. of crude were run out of the district. This seems rather small when compared with some of the recent discoveries but it must be remembered that the acreage was held in large blocks and only a limited number of operators were working the field. Political blindness also retarded work and prevented this field from showing anything like its capabilities during the early stages of development.

South Mountain Field

The South Mountain Field in Ventura County is perhaps one of the most picturesque fields in the State, the hills being quite rugged and precipitous and presenting a series of many varied colors. The Oak Ridge and affiliated companies operating in this district have successfully met many difficult problems in locating rigs, building roads and installing pipe lines. The productive area in this field is on the north slope of South Mountain, 4½ miles southeasterly from Santa Paula. The center of the field, about half way up the slope, is approximately 2,000 feet above the sea level. The mountain is composed of sandstone and sandy shale deposits which are easily eroded. Numerous faults have given the rains an opportunity to carve fantastic gorges in the mountain sides, leaving sheer cliffs, jagged promontories and seemingly inaccessible canyons. The extremely rough character of the topography makes development unusually difficult but the application of scientific principles by operators have overcome this handicap.

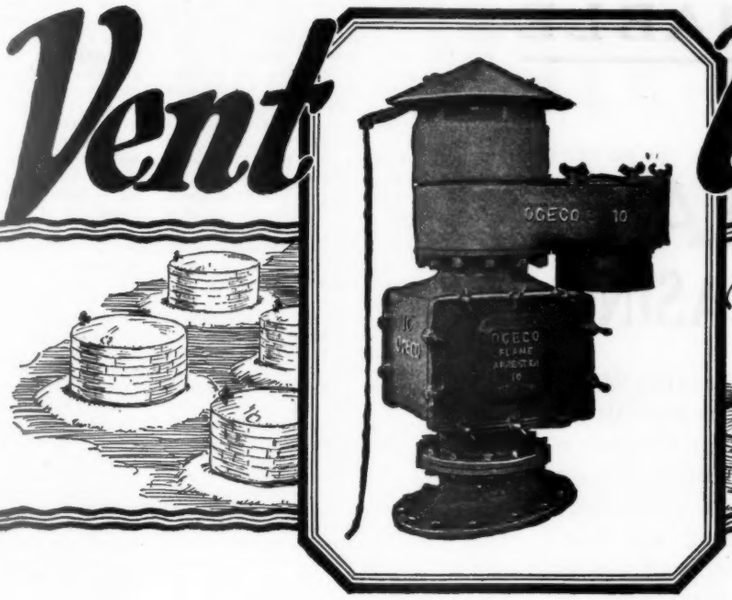
Location was staked for the first test on the steep eastern slope of Willard Canyon in 1916. Work was slow and hazardous because it was necessary to construct a road and snub rig material down the steep slope. The discovery of oil in this wildcat proved the necessary stimulant for the inauguration of a broader and more comprehensive program. The original road was replaced by a roadway on a minimum grade, permitting economic trucking and from this principal road tramways were constructed to wells literally located on the mountain side.

In many instances several thousand cubic yards of excavation and the construction of reinforced retaining walls are required before even the rig can be erected. Pipe line problems are varied owing to the topography and suspended lines are quite common. The South Mountain Field, which is situated adjacent to high-priced citrus land, has one of the most comprehensive reclamation basins in the State. It is necessary to prevent any oil or well bailings from draining into the Santa Clara River because the water of the latter is used for irrigation purposes. To accomplish this concrete reclamation sumps have been built at the mouths of the canyons which empty into the river. There is a diversion dam above each sump which normally turns all the drainage into the reclamation basin. Drainage water carrying mud and oil comes into the end chamber and flows successively through the other six and out over the spillway into the last chamber. The fluid travels during this process 315 feet depositing en route most of the mud and oil in the first two chambers. The oil, skimmed off the surface, is used for road oil or pumped to the treating plant.

Ventura Avenue Field

Although the Ventura Avenue Field has been a component part and a big factor in Ventura County production for several years, it has only been during the past year or so that any considerable amount of interest has been taken in this particular area. The initial output of recent completions in the Avenue Field has been quite large due to favorable development work resulting in deeper drilling. The most productive level is between 5,000 and 5,500 feet, wells completed at this depth being good for anywhere from 500 to 5,000 bbls. a day. The

Vent Units



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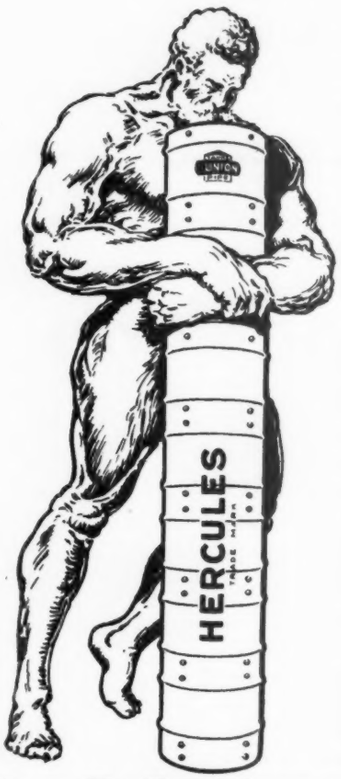

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oil is of a high quality, carrying a gasoline content of approximately 30 per cent. Practically all of the acreage is held by the Associated, Shell and General Petroleum, although additional drilling may prove the existence of a small production belt outside the holdings of these companies. The field, distinguished as the Ventura Avenue Field, is so called because of its proximity to the city of Ventura, founded by the Franciscan Fathers, early California pioneers. Ventura was originally termed San Buena Ventura because of the Mission of that name established at this point and, although such is its official name today in court records, the prefix has been dropped and the name shortened for commercial reasons.

The Associated is by far the largest operator in the Avenue Field from a production standpoint and rightly merits this distinction because of its prospecting and pioneer work. The company's output has grown to such an extent that it was found necessary recently to substantially augment its pipe line, storage and marine facilities at this point. Fifteen acres of land have just been purchased and work is to start immediately on a small tank farm composed of steel tanks. When operators first started in this area railroad transportation proved adequate but it was not long, however, until tanker loadings became more frequent. In 1922 both the Shell and Associated laid pipe lines from the field to the water front where lines were run out on an old wharf from which small tankers were loaded. The depth of the water at this point was quite shallow and in order to accommodate large tankers it would require the building of another 500 feet of wharfage. The cost involved would be too great, however, and for some time loadings were made by anchoring about 500 feet off shore and running out a 6-inch hose line. During the latter part of 1924, however, this method of loading was changed by laying a submarine pipe line about half a mile out into the surf. This line, constructed by the Associated, was the first of its kind used on the Pacific Coast. It was a remarkable engineering feat but seemingly insurmountable obstacles were overcome and the line is working very satisfactorily.

Huntington Beach

Huntington Beach, the first of the so-called recent gusher fields discovered in southern California, was also the first field in the State to be in part developed by the single drilling site leases, town lot operators, organizations of concerns with no oil field experience and intensified activities of real estate promoters offering oil interests with each parcel of land. It was also the first field to experience chaotic, rather than orderly development, necessarily resulting in nonuniformity of operations, with little or no information obtained as to underground conditions. The development and use of the core barrel as a means of determining the character of formations at specified depths did much to alleviate the uncertainty of stratigraphy and to make possible the securing of more uniform shutoff depths above the productive horizon.

The field, which is located in Orange County, is 41 miles southeast of Los Angeles and 12 miles southwest of Santa Ana. It is located on a high point of the coastal fold, which extends from Newport on the southeast to Beverly Hills on the northwest, and which is marked by the productive fields of Beverly Hills, Dominguez, Rosecrans, Inglewood, Long Beach and Seal Beach. The general theory of the relation of surface topography to underground structure, together with gas showings noted and reported in the area, were the principal indications of a structure containing an accumulation of oil. Gas had been noted in several water wells drilled in the area and had also been seen escaping from the surface of the ocean a few hundred feet off shore at the end of the present Huntington Beach concrete pier.

The first well at Huntington Beach, drilled by the Standard Oil Co., was spudded in December 9, 1919, and finally completed in October, 1920, although semiproduction tests were made previous to the latter date. This hole, No. 1 on Lease A, was good for approximately 45 bbls. of 14.1 gravity oil from a depth of 2,381 feet. Added impetus to drilling was given the field later with the completion of No. 1 Bolsa Chica, which the Standard finished on November 15, 1920, as a 2,000-bbl. well from 2,549 feet. Development started in earnest and many wells were put down in rapid succession, due to the fact that a great many small leases were acquired, each requiring immediate and continuous drilling.

About a year after the discovery of the field, the Eddystone Oil Corp., since acquired by the Shell, finished a 1,300-bbl. well in the extreme northern part of the field at 3,455 feet. This was a very important completion and extended the proven area nearly a mile northeast. Later developments extended the limits and a very productive deep zone was opened up in the northern part of the field. There are three zones, known as the Bolsa, Surf and Ashton, the latter being the deepest and most productive. Exhaustion, edgewater intrusion and gas depletion have since made drilling in this zone rather unprofitable. The field has settled to around 40,000 bbls. a day and should be able to maintain this production for some time to come. During 1920 the field is credited with a total production of 38,116 bbls., but during the following year, 1921, a total of 2,518,812 bbls. was produced. The total output to date is 80,066,350 bbls.

Dominguez

The Dominguez Field is part of the productive trend formed by Huntington Beach, Long Beach and Rosecrans. Present producers vary in depth from 3,900 to 4,400 feet, depending on their position on the structure. The subsurface structure is an elongated dome. The productive horizon being drained at the present time is approximately 400 feet thick and is comprised of oil sands, sandy shales and shales, the oil impregnated formations predominating. Slotted pipe, varying in size from 4¾ to 8¼ inches is set as an oil string in this field. All wells flow through tubing packed at the head, the tubing usually being set some distance above the top of the perforations in the oil strings. Most wells are tubed with 3-inch tubing, but a few strings of 4¾-inch casing and 2½-inch tubing have been used for flow strings. At present, all flowing wells in the Dominguez Field belonging to the Shell Co. and Union Oil Co. are tubed some distance above the perforations in the oil strings. The distance of the bottom of the tubing above the top of the perforations in the wells of the Shell Co. varies from 42 to 176 feet, and in the wells of the Union from 132 to 975 feet.

This field was opened up by the Union in September, 1923, although the Standard, General Petroleum and Highland Development Co. were first to prospect the area. The Highland's hole, drilled in 1917, was carried down to 3,651 feet, although the Standard's test was drilled to 5,005 feet before being abandoned. The latter well was off structure but had the former been carried a few hundred feet deeper, this company would have had the honor of opening up the district and reaped enormous profits.

The General Petroleum had practically all of the present proven acreage tied up but was content to await the outcome of the Standard's test. No. 1 Carson of the General Petroleum, abandoned in 1917 at 1,622 feet, is only 300 feet away from the Union's present No. 1 Carson, a producing well. Had this concern drilled independently and reached the present producing horizon, it would have undoubtedly become a much bigger factor in California than it is at present. The property was relinquished, however, and remained dormant until the Union and Burnham Exploration Co. put down their successful wildcat, No. 1 Callender, which was brought in doing 1,250 bbls. of 32.0 gravity oil from 4,068 feet. The Union, Burnham and Shell had tied up just previous to starting the well what was thought to be the entire structure. Soon after the initial well was completed, however, the General Petroleum re-entered

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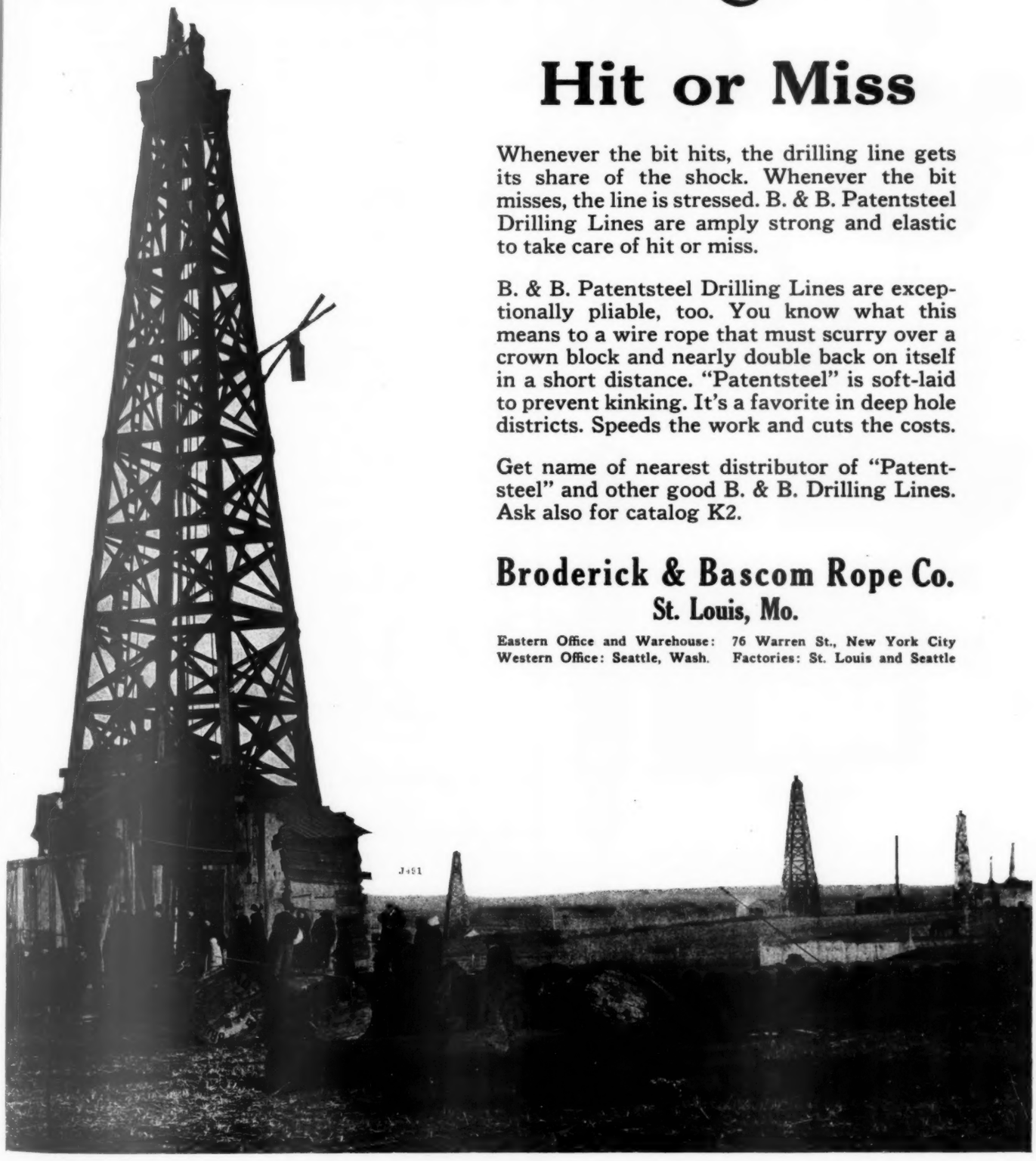

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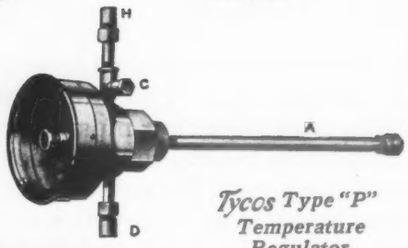

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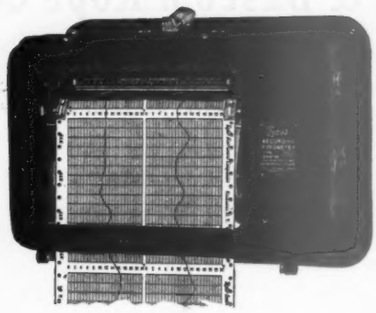

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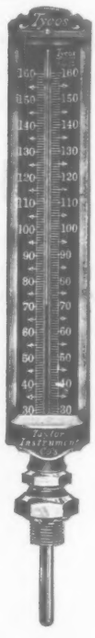

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the field and secured acreage as did also the Associated, Marland and United Oil Companies.

The General Petroleum Co. spent well over a million dollars in developing its property located in the extreme northern part of the field but only has one small well to show for its efforts. The Associated, Marland and United in the southern part of the field, were a little more successful and have built up a nice production between them. The district is being developed along systematic lines due to the splendid cooperation of the various companies and should have a long life. Production is at present coming from but one producing horizon, but recent developments indicate that a second and somewhat deeper zone exists.

Long Beach

The Long Beach Field, some times designated as Signal Hill, is located at the north city limits of the city of Long Beach in the southern part of the Los Angeles Basin and about 2 miles from the coast. A map of the area shows a number of hills lying along a line striking about 42 degrees west. These hill extend from the San Joaquin Hills in the southeast to and including the Cienega Hills on the northwest. Their elevations range from about 60 feet above sea level to 520 feet in the Cienega Hills. Low river valleys, or mud-filled estuaries lie between the various hills. Along this line, about midway between the San Joaquin Hills, and the Cienega Hills, rise two dome-like hills whose summits lie about 1 mile apart. The higher of these, Signal Hill, has an elevation of 365 feet, the lower, Reservoir Hill, 215 feet. Bordering the northwest side of Signal Hill there is a well-marked terrace.

The existence of a structure at Signal Hill had been known for a long time, for the dips in the San Pedro formation exposed on the hill indicate a closed anticline, although it was believed for a long time that the structure terminated at the northwest end. This has since been proven erroneous, in view of the fact that this is the richest part of the pool. The structure lay dormant for a good many years because of the timidity of wildcatters and a series of unsuccessful prospecting in this general vicinity. Several dry holes had previously been drilled at Dominguez and in the Cienega Hills near Inglewood. Both tests were carried to below 5,000 feet but the now proven limits of Dominguez and Inglewood indicate that they were just off structure. The Union preceded the Shell into Long Beach and drilled a duster several years before at a point which has since been found to be less than one-half a mile from production. It was, of course, not located favorably with respect to the structure but it had a tendency, nevertheless, to condemn the area. It was not until the Huntington Beach Field was opened up that a general survey was made of the possibilities of the coastal uplift. This study and resulting development work opened up the recent major pools in this area.

Most Prolific District

The Shell's discovery, No. 1 Alamitos, which opened up Long Beach, without doubt the most prolific district ever developed in California, was a comparatively small well, finished in June, 1921, and yielded only 500 bbls. from 3,114 feet. It was followed, however, by larger wells and the field, in addition to being the scene of several disastrous gas blowouts, has yielded many producers in the gusher class during the past several years. A total of 184,363,354 bbls. of crude has been withdrawn from the field since completion of the discovery well.

The several producing horizons present are designated as the Wilbur, Alamitos, Brown and Bixby zones. The first few wells were drilled to the cementing point with rotary and then finished with cable tools. With the exception, however, of these wells, all the drilling since has been by the rotary method, due to the fact that greater speed is made with rotary equipment. Long Beach, because of the existence of a town lot area, is very much over drilled but, nothwithstanding this condition, the field has been a rather remarkable one. Many early attempts were made to consolidate the small holdings into community leases but generally tempting offers of larger royalties and bonusues, speedier drilling and the owners' desires to have individual wells worked against the community idea.

Northwest Extension

Without doubt Long Beach has been the most consistent field of major proportions ever opened up and the new northwest extension is a fitting climax to the development of this remarkable area. One must not get the impression that this field has ceased to be an important factor as it will no doubt continue to exert a powerful influence for years to come. That it will decline is a foregone conclusion but even after this drop it will continue to rank as one of the largest producing areas in the State. Maximum production was attained in October, 1923, when, due to deeper drilling, the daily output during that month reached 244,527 bbls. Based on weekly estimates, the field surpassed this figure but as far as the actual output during any calendar month is concerned the peak was reached during October. From the high the daily production declined to 104,000 bbls. in September, 1925, but is again on the up trend due to development work in the northwest extension and may perhaps reach 125,000 bbls. before starting on the down grade once more.

The simultaneous development of Huntington, Long Beach and Santa Fe Springs created one of the most chaotic periods in the history of petroleum in California. The spectacle is of too recent origin to require any mention of the means taken to cope with the situation or its effect on the entire industry. The stupendous production which these fields yielded resulted in severe price cuts in crude and refined oils, not only in California but elsewhere as well. The industry is still handicapped as a result of conditions arising at that time but a look into the not very far distant future is quite encouraging and indicates a cycle of prosperity for the entire industry. Inglewood and Rosecrans, the former in particular, were responsible to a large extent in preventing the return to normalcy during 1925 but these two will, barring the development of a deep zone at Inglewood, cease to be the dominating factors which they were during the past year.

Santa Fe Springs

The Santa Fe Springs Field is named after the little town of Santa Fe Springs, located about 12 miles east of the city of Los Angeles. The town site of Santa Fe Springs, inside the proven limits of the field, comprises about 350 acres, occupies approximately one-half of the top of the structure and is cut up into about 100 leases. This town lot section was directly responsible for the mad development that forced the large companies to follow the lead of promotion concerns and resulted, in addition to the needless drilling of offsets, the throwing on the market of enormous production. The structure of the field is a closed anticline whose axis trends northwest and southeast. No surface dips are exposed but the possibilities of oil accumulations were suggested by the slightly elevated country and the presence of gas in numerous shallow water wells.

Although production was first credited to Santa Fe Springs during 1921, several wells antedated the big well of the Union and produced oil in limited quantities for several years. It was back in 1907, when Roosevelt was President, that the Union secured the original Meyer lease and started work on well No. 1 in October of the same year. The first hole and its successor, No. 2, were both abandoned after several years' work and in 1917 the third well, No. 3 Meyer, was started, which ran into so many fishing jobs that about all that was left of the original equipment were the boilers. This well, which was a small one, was finally completed in October, 1919, after drilling continuously for two years and seven months. It remained for No. 1 Bell, however, another Union well, begun in 1919 and completed in 1921 after another hard campaign of two years, to focus the attention of operators on this prolific area.

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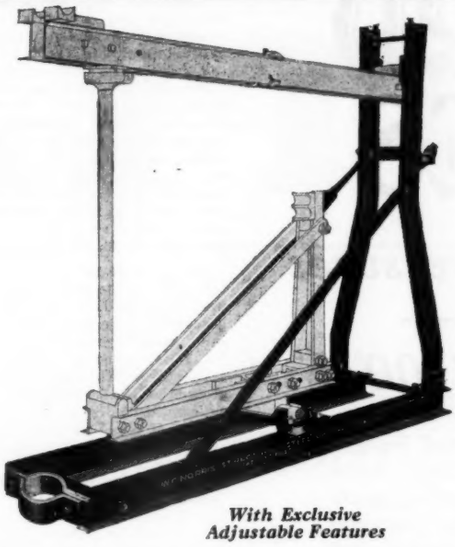

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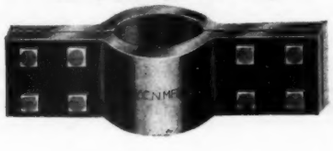
Bull Plugs

Norris fittings are called "Quality Fittings" for very good reasons. Ask the operators, they helped name them.

W. C. NORRIS, MANUFACTURER
TULSA, OKLA.

"Nor-Grip" Casing Clamps

Another instance where instant approval has been won for Norris products by superior workmanship and design. All surfaces machine finished. Absolute insurance against dropping casing through the clamp.



Swedge Nipples

Each fitting is lathe turned and reamed. Only the best of material and workmanship is good enough for these fittings.

EDWARD VALVES

Forged Steel—*for pressures up to 500 lbs.,—— temperatures to 1100° F.*

That's the service for which Edward Forged Steel Valves were built—therefore their selection not only assures dependable and accurate action under normal conditions but provides for the same certainty of operation under peak pressures and extreme emergencies.

While ruggedly designed for severe service and of high grade construction they are manufactured on such a quantity basis that they are low enough in price to allow their use in low pressure line.

Edward Forged Steel Refinery Valves have 100% pipe area. Bodies, bonnets, glands and union nuts are machined from solid steel forgings, other parts of steel or Monel Metal as required. Special all-steel valves for use with sulphur content crude.

The Edward—*forged steel*—is a valve that can be standardized on and used anywhere. Built in Globe and Angle pattern with Edward Protected Seat and Disc or Plug-type and in sizes from ¼ in. to 2 in. inclusive.

We have a special "Refinery Valve Book" —request a copy for your files.

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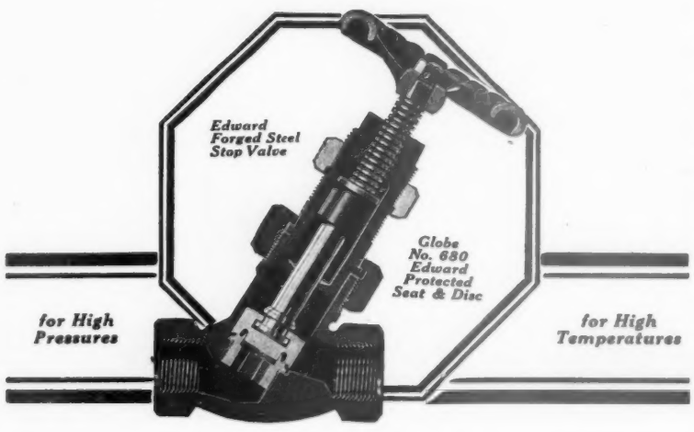
Main Office and Works - East Chicago, Ind.

Representatives in all principal cities.



The field, due to rapid drilling resulting from the town lot area, experienced a quick rise and rapid fall.

Three Oil Zones

Three oil zones are present, varying in extent and productivity. The Bell zone lies between the upper, designated as the Foix, and the lower, known as the Meyer. The Foix is picked up around 3,500 feet, the Bell at 3,850 and the Meyer at 4,650 feet. There is also a gas zone present encountered at depths ranging from 2,000 to 2,100 feet, from which several gas wells are now producing. It is this gas zone which was responsible for the spectacular gas blowouts and fires which wrecked and completely destroyed some 8 or 10 wells in the early stages of development.

Of the three oil zones, the Meyer was the most prolific and, although it was the first discovered, it was the last to be developed. The first completions in this sand, several years before the advent of No. 1 Bell, were far out on the structure and consequently small. The big output secured in No. 1 Clark of the Elliott Petroleum, drilled some time after the completion of No. 1 Bell, resulted in a mad rush to reach this more productive zone. Many wells passed up the Foix and Bell entirely and drilled direct into the Meyer. Water trouble, exhaustion, reduction in gas pressure and inability to pump economically from this depth, has resulted in the plugging back of many wells in the past year.

The total output of Santa Fe Springs from the initial completion of No. 1 Bell in 1921 to date is 125,115,691 bbls. Royalties paid land owners varied in amount from the usual 16⅔ per cent to as high as 50 per cent and in practically every case, cash bonuses in addition to the royalty were usually a consideration. For one 19-acre tract a bonus of $414,000 and 50 per cent royalty were paid, while in another instance, a single well location brought $15,000 cash and 40 per cent royalty. The average cost of a well in this field was about $100,000 and the time required to drill into the Meyer zone about 190 days. Initial cost and drilling time, of course, varied considerably.

Torrance

The first well was actually put on production in the Torrance Field by the General Petroleum during May, 1922, although the Chanslor-Canfield Midway Oil Co. had spent several months previous to this time trying to secure commercial production in No. 1 Del Amo. Although the General Petroleum got the first commercial production by finishing No. 1 Petitfils good for 139 bbls. of 12.7 gravity oil from 3,521 feet, the Chanslor-Canfield Midway Oil Co. is generally and correctly credited with opening up the district. Considerable difficulty was experienced in finishing No. 1 Del Amo because of the low gravity of the oil and a troublesome sand which persisted in clogging up the screen. It was finally completed about a month after No. 1 Petitfils and proved good for 324 bbls. from 3,500 feet. No. 1 Del Amo is located in the Redondo, or Torrance, section of the field, as distinguished from the Lomita area and, although most of the early work was in this vicinity, the field was extended toward Lomita quite rapidly by the completion of new wells.

When the outer limits were finally established it was found that the field extended over an area well in excess of 2 miles. All of the Lomita area has been drilled up but the Chanslor-Canfield Midway Oil Co. has considerable undeveloped acreage in the Torrance section. The residents of Redondo, a beach city adjoining Torrance, refused to allow any drilling inside the corporate limits and hence there is still a little undeveloped acreage in that locality. The period of big production has passed, however, and future development work will be productive of only small pumpers. Many deep tests were drilled in an effort to pick up a deep zone and it is pretty well established that none exists. The field reached a maximum output of around 60,000 bbls. a day, due principally to operations of the Standard, Shell, Petroleum Securities and Chanslor-Canfield Midway Oil Co. No real large gushers were finished but the field yielded quite a number ranging between 500 and 1,500 bbls. a day.

Rosecrans

There have been many attempts to develop production in the Rosecrans-Athens section but it remained for the Union Oil Co., following its success at Dominguez, to bring in the first commercial producer. This company, working on the advice of its geological staff, arrived at the conclusion that there would be another structure north of Dominguez. Considerable acreage was tied up before work began and drilling went along rather uneventfully for several months. Showings were picked up, however, in this test, No. 1 Rosecrans, and the company deemed the outlook so favorable that the Union entered into a working agreement with the Potter Oil Co. to their mutual benefit. The Potter had previously suspended work in the Athens section after going to 4,525 feet. The Union re-entered this hole and opened up the Rosecrans Field in May, 1924, by finishing it at 4,971 feet good for 815 bbls. a day, the oil being clean and testing 37.2 degrees. The Union and Barnsdall control considerable acreage in this area, each having a production split in the other's property. The Union spent several hundred thousand dollars on its initial test, No. 1 Rosecrans, before it was finally finished, water and mechanical trouble holding up work for a long period of time.

LYMAN STEWART

Lyman Stewart, now deceased, was one of the most prominent figures in California petroleum history. His connection with the oil business antedated that of John D. Rockefeller by three years, Mr. Stewart having been engaged in the development of oil properties from 1859. He was chairman of the board of directors of the Union Oil Co. of California.

E. J. Miley was responsible for much of the early development work and his success in pioneering both the northern and southern parts of the area has gone a long way toward stimulating work. It was he who solved the water problem in the southern part of the field and his pioneering in the northern or Athens section was responsible for the large number of wells in that area. He also has the distinction of finishing the deepest oil producer in the world and, although his No. 6 Athens may never pay out, it indicates the possibility of deep drilling.

The field which has yielded 7,112,843 bbls. since being opened up produces a high gravity oil and although there is still considerable undrilled acreage it looks as though the high point has already been passed. Fields producing exceedingly high gravity oil are generally short lived and if this holds true at

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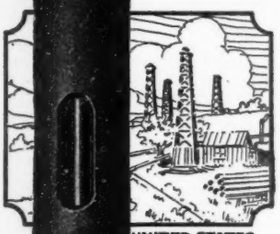

Its popularity has spread rapidly since it was first introduced in Eastern fields. The one reason for its present wide distribution in service is *good results.*

This famous pump is designed to meet all conditions, and does, with an unusual degree of satisfaction. In every way it is representative of *The Larkin Line* and reflects the way in which all our Drilling and Fishing Tools have fulfilled the needs of the Industry.

Today *The Larkin Line* is more complete than ever, but it still has its basis in the one characteristic we have always held fundamental—*thorough reliability in the performance of the duty for which intended.*

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Our new catalogue No. 30 describes The Larkin Line. May we send you a copy?

LARKIN & CO.

BUTLER, PA., U.S.A.

Rosecrans the field will prove a dismal failure at least as far as production in the town lot area is concerned. As a general rule, the wells come in making around 1,000 bbls. a day but decline at least 50 per cent within two weeks. The Union, Barnsdall, Associated and one or two others with sufficient acreage to allow a normal spacing stand an excellent chance to pay out, but it looks as though many of the operators in the town lot section will end up with a red ink figure on the ledger.

Inglewood

Credit for opening up Inglewood, California's latest oil district, belongs to the Standard Oil Co. and is directly due to its operations on Los Angeles Investment Lease No. 1, although some mention should be given the work of the Mohawk Oil & Gas Co., which also successfully pioneered this area. The latter, however, neglected to secure sufficient acreage to take advantage of its good luck and as a consequence, its leases are productive of only small pumpers. The Standard, on the other hand, augmented its holdings and today holds the greater part of the productive area. In addition to these two companies, the Petroleum Securities, Pan American, Associated, Shell, General Petroleum and several smaller operators are developing their respective leases.

The initial producer, No. 1 on Los Angeles Investment Lease No. 1, was a comparatively small one doing 165 bbls. of 18.3 gravity oil from 2,134 feet but later completions came in doing anywhere from 250 bbls to 5,000 bbls. The production peak was reached in August, 1925, the output that month being 3,230,587 bbls., a daily average of 104,212 bbls. The completion depth is around 2,500 feet, some holes having a penetration into the oil sand from 100 to 1,500 feet, varying with respect to their location on the structure, the average penetration being about 600 feet. The greater penetration is peculiar to practically all of the wells in the northern part of the area, the sand in those further south being somewhat shallower. A very appreciable production has been built up to date due to numerous completions in the more productive section of the field where the initial daily output is averaging around 1,000 bbls. a well. There have been several deep tests put down but none of them has been favorably located with respect to structure. It is quite possible, therefore, that the existence of a deeper horizon may be proven at a later date. The sinking of a favorably located deep test is dependent upon production from the present level, as it is not believed that any considerable amount of deep drilling will be undertaken as long as the present production of individual wells holds up. The underground structure is a well defined but gently folded anticline with the axis trending northwest and southeast. Lateral dips from the axis do not appear to be greater than 10 or 15 degrees. There is a fault about a mile northeast of the axis and somewhat parallel to it which extends completely across the Baldwin Hills. Its presence is marked by the low escarpment which traverses the hills and the valley, of which the escarpment forms the east slope. This fault has always been considered as limiting the productive area to the northeast. The rapid rise in production at Inglewood is due chiefly to the ease of drilling, low drilling cost and minimum time required for completion. The large penetration and high gas pressure augurs well for a long-lived field which will yield maximum returns on a minimum investment.

The superficial and rather incomplete resume of California's petroleum history was written as an humble tribute to California's immortal pioneers, who in part opened the way to the greatest era in history. This is truly an age of petroleum without which the world would revert back several centuries. We look forward to the pioneers of the future to revere the memories of those who have answered taps and continue the search for the same farmer sands and carry on.

USING ECONOMIC FUEL BURNING IN REFINING

(Continued from Page 136)

tomorrow, that of saving fuel in the plant with which you are connected, perhaps a few hints on handling the work might be of assistance in case the job was one with which you had little actual experience. First, try to secure the cooperation of the men responsible in firing the fuel. Second, study the fuel and equipment in use; a talk with the fireman is helpful. Third, stop up all air leaks around the furnaces through which excessive air can enter. This repair work will raise the furnace temperature, give better draft and in consequence, save fuel. Fourth, see that the heating surfaces are as clean as they can be made without seriously interfering with production and arrange to keep the heating surfaces clean. Fifth, repair such furnaces as have fallen into a bad state of repair and clean out the flue connections to those furnaces which have bad draft. Sixth, inspect the heat insulating material used on the tops of stills and boilers and to cover steam lines and arrange to repair such insulating material where damaged; these repairs will save heat that has already been absorbed by the oil or water as the case may be. Seventh, in the case of boiler installations that no steam is needlessly wasted through bleeders, traps or leaky valves. If exhaust steam is wasted by blowing to the air make arrangements to pipe the exhaust steam to a low pressure steam line; exhaust steam can be used in certain classes of stills, for heating wax sweaters, and for heating buildings during the cold season. If the power demand in the refinery is large exhaust steam could be used in low pressure turbines, provided a sufficient quantity of exhaust steam is available. Eighth, provide the required instruments for testing combustion conditions so that the results of the improvements can be checked and that the firemen can be aided in their work by the tests made under actual working conditions. Not an easy job nor one that can be done in a few days but steady work along the lines suggested will cut fuel costs. Only by constant effort and alertness, however, will the best results be achieved, spasmodic combustion tests do not get results in cutting down the yearly fuel bill.

Weighing the Fuel

Arrangements should be made to measure or weigh the fuel supplied to the different fuel consuming units in the refinery, the data so obtained should be worked up by the accounting department in some simple form for the purposes of comparison and these results handed to the foreman in charge of the units at the earliest possible time to avoid lack of interest by presenting data so old that the details of the work have been forgotten. Scales to weigh coal and meters to measure oil or gas are a part of the group of essential instruments needed to carry out a fuel conservation policy and this equipment ought to be kept in good repair so that the results obtained in the plant can be followed with the assurance that the fuel consumption figures are correct. It is not suggested that the fuel be weighed to each separate still or boiler but that the fuel required to operate any particular boiler house or group of stills be accurately measured at all times and the fuel consumption be reported weekly both to the management and to the operating foremen. Steam meters to measure the steam produced and oil meters to check the tank gauges of oil charged to the stills are of assistance to the operators and also to the accounting department who make up the operating cost figures.

Use of Towers

Many stills in late years have been equipped with towers for the purpose of making sharper cuts than are obtainable without their use and thus avoiding redistillation. In all cases where such towers are installed and the oil which has condensed in the tower is again returned to the still, the fuel consumption for a given quantity of oil run

K & J Electric Steel Valves

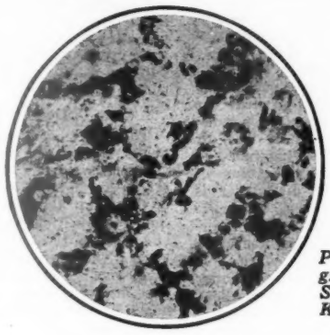

Photo - micrograph of Electric Steel used in all K & J Steel Valves.

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The fine grain metal, as shown in the photo-micrograph, comes from the electric furnace and possesses great strength, ductility and uniformity. The steel is clean and the grain structure well broken up by the annealing process. Electric steel means longer life, fewer repairs and replacements, less shut down time and lower power costs.

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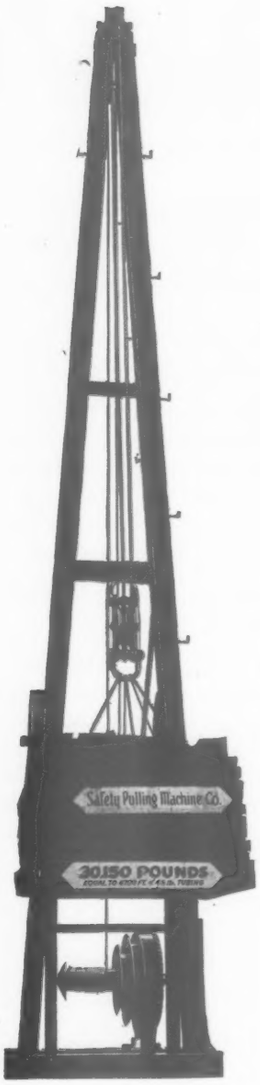
Eclipse Deepwell Pulling Machine

That one company recently purchased 6 of these machines to be used in a country 6,000 miles from the United States is proof this Pulling Machine is good.



Eclipse Deepwell up to 8000 ft. 2" Tubing Weight 3645

Wreckers also made to order, approximate weight 5000 lbs. One of our customers stated that he has pulled a weight equal to 100 tons with one of these machines.

Specifications Deep Well

Mast 8x10x36 ft., Douglass Fir A-Style Two Wheel Truck, two 16" Bronze bearing crown pulleys, 2½ Steel Pin mounted in malleable boxings. Large supporting plate 16" dia. between crown pulleys, eliminating any chance of bending pin.

Reel or Drum; 32 lb. 8¼ casing filled with concrete for winding drum, differentials banded with 3/16 band iron, brake surface 6"x40", choke brake style same as star drilling machine.

The whole reel assembly is mounted on 2¾ square steel shaft extending clear through reel, secured by three heavy castings.

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through the receiving house, is increased. Even though the fuel consumption is increased on units fitted with towers over those without tower equipment it does not follow that the total fuel consumption in the plant will be increased, the opposite result ought to be obtained for the oil returned to the still is hot and nearly at the boiling point while if redistillation is practiced cold oil will be charged to the rerun stills. It is important that records be kept of mechanical changes that have been made on stills or boilers and that these records be kept as a part of the fuel record in order that seeming discrepancies in the fuel figures will not arise.

The oil being charged to a battery of stills is often heated by passing through a closed type of heat exchanger, the hot residues from the last still of the battery serving to heat the fresh cold stock being charged. European practice seems to favor a special type of heat exchanger even for batch stills and also heat exchangers arranged to recover a part of the heat from the condensing oil vapors prior to their discharge to the water-cooled condenser. Few, if any, American refineries have adopted the latter pieces of fuel saving equipment.

Fuel Gas Economizer

The steam boiler type of flue gas economizer has been installed in some refineries on continuous batteries of stills. A series of pipes convey the cold oil across a passage through which the flue gases from the stills in question are passing on their way to the stack. A fan is often required to compensate for the drop in flue gas exit temperatures due to heating of the oil and also the extra friction caused by the economizer. There are still some problems to be solved in the adaption of this type of fuel saver to petroleum stills; some crude oil carrying small percentages of salt water will form a scale of salt on the interior of the economizer tubes if the temperature and pressure carried on the oil in the economizer is not adjusted so as to prevent evaporation of the water. Another difficulty encountered is the cleaning of the outside surface of the tubes, because of the high temperatures of the flue gases ordinary soot blowers and scrapers fail to stand up as they do in boiler installations. No difficulty is presented, however, that cannot be overcome by minor changes in design and it is to be expected that economizer equipment utilizing the waste flue gases to heat the oil charged to the stills, will be standard equipment on continuous batteries of stills.

Air Preheaters

Air preheaters are being experimented with in large power plants to heat the air furnished to the furnace for combustion with waste flue gases. The air heater has been used for saving fuel and so increasing the steaming radius of ships. The object of the air heater is the same as the economizer, to utilize a part of the heat which would otherwise be carried about with the flue gases up the stack, the temperature of the flue gases being too low to permit the boiler to absorb any additional heat from them. Air heaters have many possibilities in petroleum refining practice as they can be built to operate on a single still if necessary. Another feature is the fact that many refineries use oil or gas fuel and no trouble will be caused by the action of a heated air supply on grates or stokers.

Another new development in the field of fuel economy is that of firing coal in powdered form under boilers. A coal which can not be fired satisfactorily on most stokers can often be handled in powered form with good results. Another point in favor of powered coal is the ease of firing the coal in this form, the rate of firing can be altered with the same ease as oil or gas fuel. As powdered coal furnaces are similar in design to oil or gas furnaces, such a furnace can be arranged to burn any of these fuels in the same furnace if so desired with no major alterations. The ash problem in powdered coal firing under boilers has been one of the drawbacks to this method of firing, the difficulties have been overcome to a large extent. With recent steam boiler practice as a guide the successful use of powdered coal in petroleum still furnaces can be anticipated as one of the improvements to be introduced shortly.

With so many developments and improvements in equipment in the field of combustion, an uninformed person may quite readily arrive at the conclusion that all that has to be done is to purchase this or that automatic device and fuel saving will be assured. Please do not fall into this error; as truly marvelous as some of the modern fuel firing equipment is, all such equipment requires attention from qualified men to keep the equipment in shape. Fuel economy is not alone a matter of instruments or expensive equipment to fire the fuel, but also an earnest and continued effort on the part of all persons concerned to achieve and maintain fuel economy. Without cooperation of the interested parties progress in burning fuel economically will be slow and the plant management may decide that the old way is as good as any; team work so vital in athletic competitions is the thing to strive for in securing low fuel costs.

Sharp distinction should be made between so-called acceptance test conditions where every precaution is taken to secure the very best possible results with the equipment on test, and every day operation of the same equipment. Acceptance tests show what can be done when all details are closely watched and serve as a guide to daily operations where the work must be done by one or two men and not a staff of trained experts. Perhaps a better standard of testing equipment used in the petroleum refining industry would be to base all tests on data secured during regular daily operation without the usual expert attention given in formal tests of the acceptance variety.

OIL SITUATION IN RUSSIA IS IMPROVING

(Continued from Page 140)

old units were modernized, but even now they are very inefficient, and if compared with American refineries, they are obsolete. The Azneft is studying cracking processes and will probably build new refineries in Baku shortly. For export purposes it is planned to erect large capacity refineries in Batoum and Touapse to include the latest achievements of the United States. These refineries will be built together with the pipe lines from Baku and Grozny, and consequently they will not be ready for operation for at least three years.

Deeper Drilling

The effect of deeper drilling in Baku fields will be the change in the gravity and quality of oil. The petroleum is generally heavier in the deeper formations of the Baku district; especially so in the Sourachany Field, where the upper light oils apparently migrated from lower horizons. The deeper oils are quite rich in lubricants; and the decrease of original gasoline percentage will be more than offset by the operation of modern cracking units.

The natural gasoline plants are still absent, though preliminary work is under way. The unconfirmed reports state that the gas from various fields averages 0.75 gallons per 1,000 feet, charcoal test.

Transport and Export

During the past year the transportation units were forced to their limit and were able to move from Baku 31,105,000 bbls. The production is estimated at 33,400,000 bbls., and, therefore, most of the new oil was moved from the fields. It is impossible to estimate the present potential production of the Baku district, since the continuity and the extent of the shut downs is not made public. All of the new production had to be exported because all storage space was filled during previous years. The stocks on hand are estimated at about 8,000,000 bbls. in the Baku district alone. With the exception of products already refined the stocks are diminishing in value very considerably, since all crude is stored in open storage, or in the earth storage very lightly covered. Losses are at pres-

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Jones' Acme Sucker Rods, and Gas Engines.

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†Olney, Texas
†Duncan, Okla.
†Breckenridge, Texas

*SHREVEPORT, LA.

†Shreveport, La.
†Smackover, Ark.
†El Dorado, Ark.

*TULSA, OKLA.

†Tulsa, Okla.
†Bristow, Okla.
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Neco Pump

Fig. 22 Fig. 21

Fig. 22 8-cup

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ent estimated up to 50 per cent in value, with the increased cost of refining it is likely that the ultimate value of old stocks will not exceed 20 or 25 per cent of their original valuation.

The Caspian Sea tankers moved 23,800,000 bbls. or 71 per cent of the total; 22,180,000 bbls. went to Astrachan for home market; 360,000 bbls. were shipped to Petrovsk; 200,000 bbls. were exported to Persia, and 1,060,000 bbls. went to Krasnovodsk in Tourkestan. The fleet operated 22 tankers with 37,813 tons capacity, against 29 boats with 41,583 tons capacity last year. The work was towards capital repairs of engines, thus speeding up the trips. An increase in tonnage during the present year is possible. The per month average to Astrachan was 2,764,000 bbls. during eight navigation months. The rest of the Caspian Sea is open year round.

The kerosene pipe line to Batoum experienced difficulties during past year and is not working to its maximum capacity. During last year 3,080,000 bbls. of kerosene were pumped; 92 per cent of it went via Batoum to foreign markets, while 8 per cent were consumed locally in Caucasian republics. If the Azneft will be able to put in operation some of the idle pumping stations on this line its present capacity will be increased considerably. Railroads took care of 4,225,000 bbls. Of this quantity 3,780,000 bbls. were exported through Batoum; 325,000 bbls. were consumed in Caucasus and 120,000 bbls. were moved to Russia.

Labor

The employment figures continued to be very high. The total number was averaging 47,000 men, divided as follows: In the production department, 25,000; in drilling, 8,000 men, and in refining, 5,100 men, with the balance distributed between power plants, transportation, mills, warehouses, etc. The analysis of figures will show that the refining and drilling ends of the industry employed about the same number during the past three years. Both these branches are specialized and the improvements in engineering increased the productivity per man, in one case the increased runs of refineries and in the second the increased footage. But even at the present rate there are about 30 men per drilling rig, and there is a very considerable room for improvement.

The production department employment shows the worst figures. In the first place the number required by old methods was extravagant, and the present management, even though introducing modern equipment on a large scale, cannot get rid of surplus labor, and apparently will not be able to do so until the shipments from the fields will at least double. The Eastern Caucasus does not support any other major industries, and movement of labor from Baku is out of the question.

During last year the cost of labor per barrel of oil produced decreased from 48 cents to 46 cents, which alone means a saving of about $668,000 per year. The figures will be lowered somewhat during the next year, and more so when the pipe lines will be constructed. During that time the labor will be sufficiently trained and a doubled production will not require more labor than is employed now. A doubled production with the same amount of labor will mean to the Azneft $16,120,000 on the positive side of the balance, or allowing for proportional increase in wages, it will give about $10,000,000. The Azneft management issued during last year strict orders not to employ new men without a special permission of the head office, and thus the number will diminish slightly during the current operating year. The order states that the men employed without proper authority will be paid from the salaries of the engineers employing.

Last year's average for Baku district was $25 per man per month, while during the 1924-25 the average was $30. The most notable increases were made in the case of the administration officials and engineers, the average being $125 per man against $50 last year. A number of engineers are receiving $200 and up, salaries quite out of line in the Soviet Russia up to the last year.

Favorable Balance

It is yet too early to estimate the balance for the 1924-1925 operating year, but a favorable balance is quite likely, though it will not be large. The Azneft is buying heavily new machinery in the United States and in Germany. The purchases are made on time payments in Germany, and the Azneft is attempting to make them here on the same basis. It is evident that without Government subsidies the oil industry cannot afford new buying on extensive scale for cash, with labor charges still running high. It appears more than likely that the new pipe lines and refineries will be built either with subsidies from the Government or by means of time payments, and evidently the foreign interests being able to offer better terms will receive the largest orders, even at the sacrifice of experience which is in favor of United States.

All considered an increase in production should appear in the next year's summary, commensurate with the increased efficiency of tankers, railroads and existing pipe lines. To increase the production the total footage drilled will have to be greater, because of deeper drilling. The cost per barrel should be slightly smaller, thus giving the Azneft an increased favorable balance in 1925-1926.

BALDWIN HILLS AND INGLEWOOD FIELD

(Continued from Page 112)

going on in the light oil fields such oil will become of increasing value.

In the Inglewood Field there are 20 drilling wells that have been abandoned and 5 that are idle; there are 155 producing wells and only 3 idle producers. Such a record compares very favorably with that of other fields. In the Long Beach Field there are:

One hundred ten drilling wells abandoned out of a total of 920 wells drilled in the field; 110 producing wells abandoned out of a total of 920 wells drilled in the field.

26 idle drillers and 31 idle producers.
553 active producers.

In the Huntington Beach Field there are:

Seventy-five drilling wells abandoned and 60 producing wells abandoned out of a total of 563 wells drilled in the field.
26 idle drillers and 29 idle producers.
328 active producers.

The curve herewith shows comparative production data of interest.

WHAT AN OIL WRITER SAW ON HAVANA TRIP

(Continued from Page 124)

globes along the Prado; they rent out the ground floors of their residences for commercial establishments, so no complaint can be registered against the oil companies.

Protest Gasoline Tax

The following letter taken from El Mercurio October 31 gives a good insight into the status of the oil producing business in Cuba:

Nafta—Production of the Montembo Fields does not cover the interest on capital invested. A petition was addressed to the President of the Republic soliciting exemption from excessive taxation.

Recently we reported that the executives of the nafta and gasoline producing companies of Cuba, through the Department of the Treasury, had addressed a petition to the President of the Republic, regarding the burdensome taxes on natural gasoline that the recent "Revenue Law of Public Works" exacts from the producer, at the same time soliciting that the law be modified according to the terms they specify. The said document, a copy of which follows, is signed by the following companies: "Compania San Elias," "Compania Luordes," "Compania Santa Maria" and "Compania Motembo Oil Co." These companies request that the President decree that no taxes shall be levied on the natural gasoline wells of the country until their production is

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big enough to supply two-thirds of the actual demand. The petition reads as follows:

"Honorable President of the Republic: We, the undersigned, as producers and owners of natural gasoline wells in Cuba, address respectfully the following petition:

"Natural gasoline wells are so rare in this country that the number of producing wells is very limited; and that, at an expense considerably in excess to their production. This is a matter of common knowledge and not difficult to prove. Eminent geologists have studied our subsoil and reported that the amount of natural gas available does not warrant its exploitation for commercial purposes.

"Nevertheless gasoline is today one of the most universally consumed products and its demand is constantly increasing in our country, we have invested, in spite of adverse scientific advice, an enormous amount of capital experimenting and drilling, all in an effort to make available whatever amount of nafta is found in our native soil.

"The production of our fields is limited that the profits do not even pay the interest and capital invested. We do not manufacture our gasoline by the liquidifying of natural gas as they do in other countries. We merely obtain it from the natural pressure of the rock structure, losing almost totally the whole production of natural gas for lack of the necessary apparatus and machinery, which we cannot afford nor pay to buy.

"This is an industry that finds itself in a critical state of affairs at present in spite of the fact that our sugar and tobacco manufacturing interests need the backing of another well developed industry, and we venture to say that it deserves the utmost protection from the Government, especially when it is one of the greatest industries attracting world attention today. Oil and gasoline are products anxiously sought all over the world, and the enterprises and corporations that are investing an enormous amount of capital in development of new fields are receiving ample protection from the Government of every country in which they operate. This protection is now in form of exemption from burdensome taxes or by granting special subventions and privileges for the safe investment of capital, in this way encouraging the growth of the petroleum industry, the discovery of new fields and bigger production, thus adding to the wealth and commercial growth of the nation.

Needs Oil Industry

"Cuba, more than any other nation in the world, needs to protect her oil industry, which is just beginning to develop, thanks to a few courageous and farsighted business men. It would seem natural that an industry that is financially embarrassed and a tax on which would bring but little returns to the National Treasury, should be freed from national taxation; but notwithstanding, a law has been passed taxing not only the sale of gasoline but also its production. In fact, under Articles 12 and 13 of the Decree No. 1,517, promulgated July 15, every producer is required to send to the Secretary of the Treasury an estimate, under bond, of the gasoline he expects to produce each month. This, undoubtedly, means taxing the production before the gasoline is actually placed on the market, thus putting the native producer and dealer at a disadvantage compared with our foreign competitors, which are only taxed on the amount which is actually placed in the hands of the consumer.

"This tax will not only mean the total loss of the capital invested by the producers after years of struggle and financial sacrifices, but also will compel us to close our oil industry forever, as the following figures will show.

"Not including the initial expense that always results in the exploiting of a new field, the following is a conservative estimate of what it costs to set up a producing unit: Machinery, $30,000; drilling, casing, etc., for an average well of 2,000 feet, $25,000; total, $55,000.

"Granting that the monthly production is 1,000 gallons the results will be as follows:

1,000 gallons at 30 cents		$300.00
Cost of extraction	$ 60.00	
Transportation and freight	30.00	
Royalty, production 10%	30.00	
Property tax	100.00	
One and one-half per cent sale tax	4.50	
Collections	0.40	224.90
Balance		$ 75.10

"This balance of $75.10 constitutes the maximum profit on 1,000 gallons of gasoline which is our average monthly production. This does not include our inevitable cost of wells going dry, drilling of new ones and repairs on the existing ones.

"Basing our petition on the grounds and facts stated above, we beg of you, respectfully, that a new decree be served to the public exempting from taxation all producing companies, until our production exceeds two-thirds of the national demand for the product."

COASTAL PRODUCTION INCREASE IN NOVEMBER

HOUSTON, Tex., Jan. 9. — The estimated gross production in the Gulf Coast pools for the month of December is 2,944,103 bbls., an increase of 71,483 bbls. over the estimate for November.

Production developed at Boling Dome in Wharton County and from a deep sand in the Piedras Pintas Pool in Duval County late in the month has been added to the total and partially accounts for the increase noted.

The following table shows the daily average, number of producing wells and gross for the month in each district:

GULF COAST POOLS
Gross Production for December, 1925

District—	No. Wells	Daily Aver.	Gross Bbls.
Boling	1	2,600	39,000
Batson	424	1,277	39,587
Blue Ridge	19	886	27,460
Barber Hill	3	95	2,945
Big Creek	18	1,000	31,000
Dayton	6	135	4,185
Damon Mound	50	1,056	32,746
Edgerly (La.)	32	433	13,423
Goose Creek	259	9,357	289,887
Humble	298	4,887	151,497
Hull	267	16,120	499,720
High Island	10	542	16,802
Jennings (La.)	57	1,362	42,222
Lockport (La.)	3	3,710	115,010
Markham	15	77	2,387
Orange	188	16,070	498,170
Pierce Jct.	12	2,311	71,641
Piedras Pintas	1	1,500	10,500
Spindletop	168	1,135	35,185
Saratoga	415	1,524	47,244
Sour Lake	435	4,142	128,402
South Liberty	115	10,204	316,324
Vinton (La.)	131	6,669	206,738
W. Columbia	116	10,148	314,588
Welsh-La Bute	...	80	2,480
Miscellaneous	11	160	4,960
Total Dec.	3,053	97,480	2,944,103
Total Nov.	2,026	95,754	2,872,620
Difference	27	1,426	71,483

Southwest Fields

The gross production in the Southwest fields for December is estimated at 1,276,776 bbls., an increase of 11 906 bbls. compared with the November figures.

Slight increases are noted in the Luling Field and the Somerset district, with small decreases in the Mirando district, including the Laredo pools and Jim Hogg County.

The daily average and gross output for the month is as follows:

District—	No. Wells	Daily Aver.	Gross Bbls.
Luling	406	21,605	669,755
Laredo	*402	3,538	109,678
Somerset	232	2,340	72,540
Callihan	20	250	7,750
Rockdale-Minerva	237	1,007	31,217
Jim Hogg County	†74	3,306	102,486
Lockhart	258	9,140	283,340
Total Dec.	1,629	41,196	1,276,766
Total Nov.	1,612	42,162	1,264,860
Difference	17	966	11,906

*Gas wells not included. †Gas wells not included.

BINKS SALES CONVENTION

The annual convention of Binks National Sales Organization was held at the Garfield Arms Hotel, Chicago, December 15 to 18 inclusive. The opening address of H. D. Binks, president, was a complete analysis of conditions in connection with the manufacture and distribution of spray painting and finishing equipment. He gave his hearers an informative array of statistical data which covered productive capacities, outputs, sales and prospects in all branches of industries.

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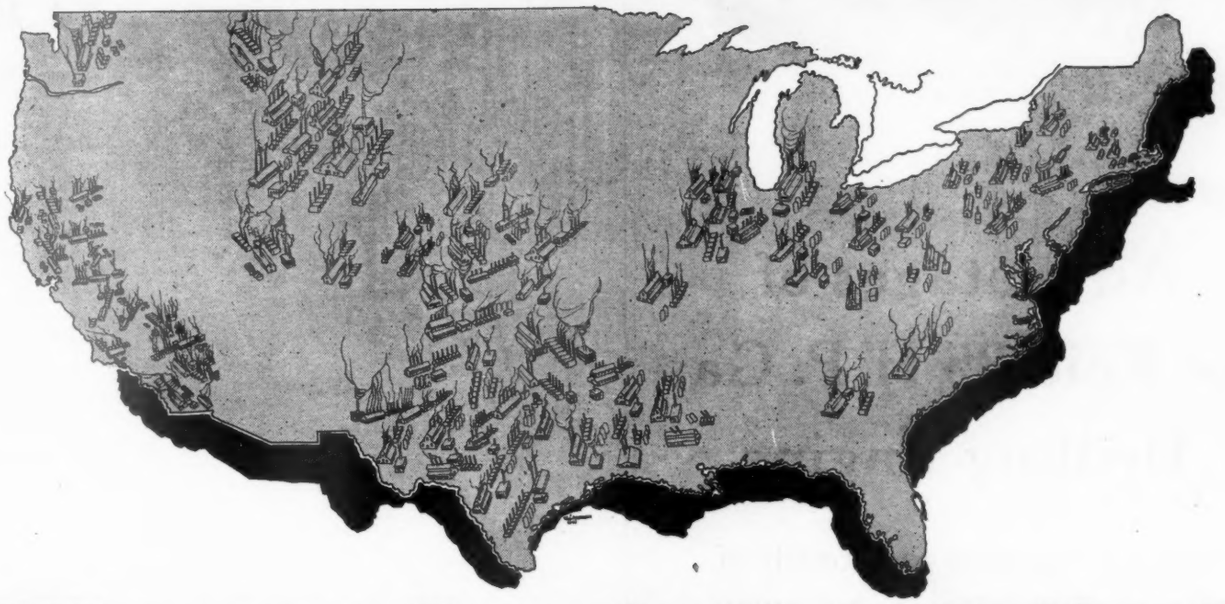

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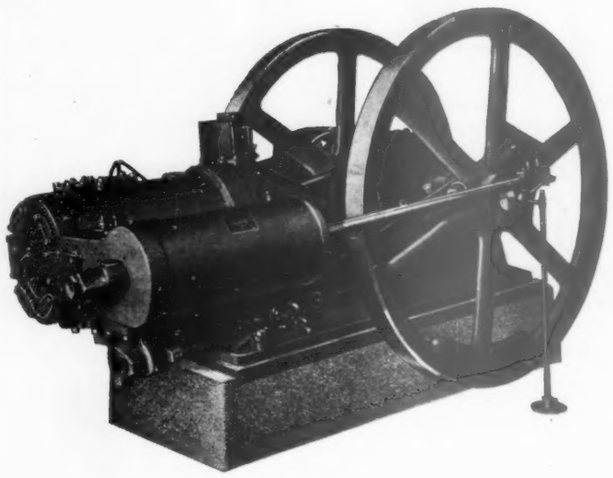

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BRANCH SHOP—TULSA, OKLAHOMA

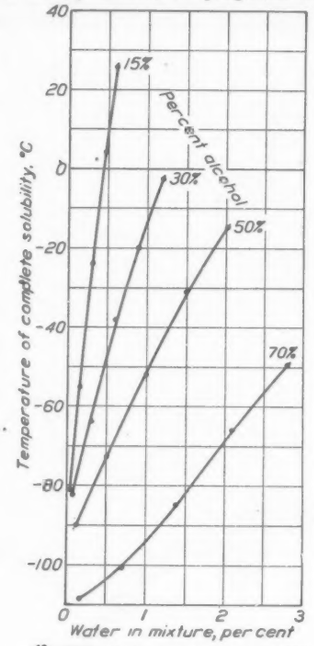
FUELS FOR HIGH COMPRESSION ENGINES

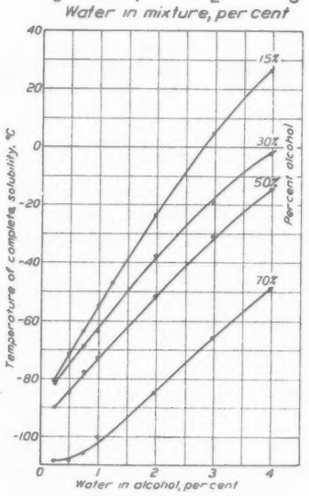
(Continued from Page 122)

measurements of acidity, unsaturated compounds and sulphur frequently form a part of acceptance tests.

Rate of Flame Propagation

This property has received a great deal of attention at the hands of those studying the properties of fuels. Measurements usually have been made by means of tubes or bombs of the constant pressure or constant volume types. Unquestionably such measurements have furnished a great deal of valuable information as to the nature of combustion and of such phenomena as preignition and





Figs. 11 and 12 — Solubility curves of alcohol-X gasoline mixtures.

detonation. With respect to efficiency, however, Ricardo arrived at the following conclusion: "No fuel has yet been found whose rate of burning is too low to permit of maximum efficiency being obtained in the highest speed engine yet tested." This statement should not be taken as indicating that the rate of burning never has an appreciable influence on efficiency, for there certainly have been cases where the limit of operating leanness has been that at which the charge was ignited in the manifold by flame rushing back from the cylinder. This occurred because the charge had not been completely burned by the end of the expansion stroke. A more rapid rate of burning would have made possible operation with leaner mixtures and hence better economy.

Perhaps one of the best known fuels for high compression engines is "motor benzol" which ordinarily contains not only benzol but also xylol and toluol. This fuel was employed satisfactorily long before its antiknock properties were appreciated or the desirability of such properties understood. Both the Bureau of Aeronautics of the Navy Department and the National Advisory Committee for Aeronautics have supported the tests of this fuel which have been made at the Bureau of Standards. Since the proportions of the various constituents which compose "motor benzol" are not fixed, the characteristics of each lot of fuel might be expected to be different. Fortunately the properties of the constituents are similar and differences between the products of several refiners proved to be rather small.

The fact that benzol had been used extensively as a fuel for internal combustion engines rendered unnecessary an examination of all the properties of a fuel which have been mentioned. Hence the following discussion will confine itself very largely to such information as was derived from the above mentioned study of the suitability of benzol as a fuel for high compression engines.

In 1923 the question of availability was taken up with the Bureau of Mines and some of the large producers of motor benzol. There was fairly general agreement that at least 50,000,000 gallons of motor benzol were annually available for fuel. Not all of this benzol, however, is

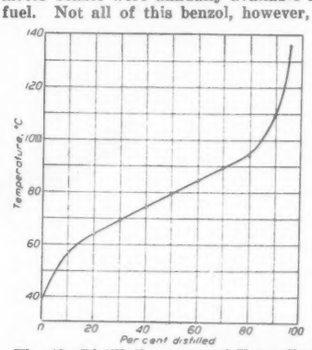


Fig. 13—Distillation curve of X-gasoline used in alcohol-gasoline solubility tests.

as free from corrosive effects as is aviation gasoline. Moreover, the belief is rather widespread that in the event of war the entire production of motor benzol would be required for the manufacture of explosives. At that time a rather careful analysis of the facts seemed to indicate that this fear was not well grounded. Nevertheless it is shared by many who have given considerable thought to the subject. It is undoubtedly true that in the event of war large quantities of toluol would be employed in the manufacture of explosives. If, as a result, the motor benzol available contained less toluol, its freezing point would be higher. This raising of the freezing point would be extremely objectionable in so far as the use of the fuel in aircraft is concerned.

Figure 5 shows some of the results obtained with the single cylinder engine, indicated mean effective pressures and specific fuel consumption in pounds per indicated horsepower hour being plotted against pounds of fuel per hour. The general procedure was to use the single cylinder engine as far as possible, checking the conclusions by means of tests of multi-cylinder engines. In most cases the data given in Figure 5 were obtained with blends containing the smallest amount of benzol which would permit satisfactory (free from severe preignition or detonation) operation at the given compression ratio. The curves of Figure 6 are derived from those of Figure 5. The upper curve of specific fuel consumption in Figure 6 is based upon a constant fuel-air ratio, the ratio being approximately that giving maximum power. The lower is based upon a mixture leaned until the power is 99 per cent of maximum. In previous work this 99 per cent value has proved to be a satisfactory basis for comparison of

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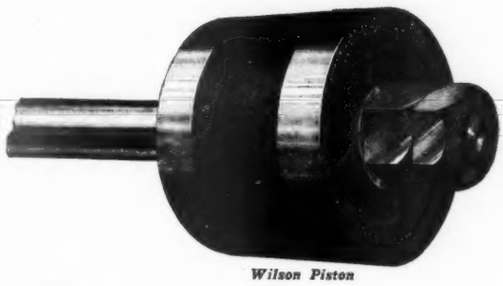

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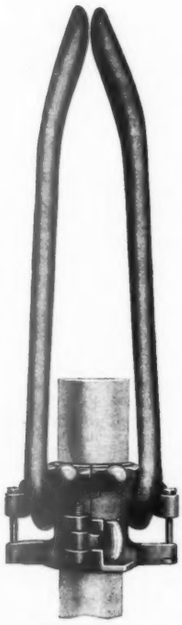

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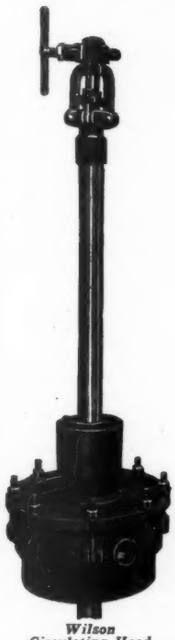

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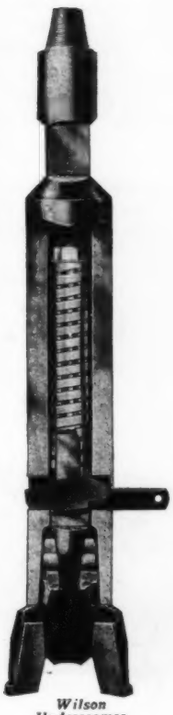

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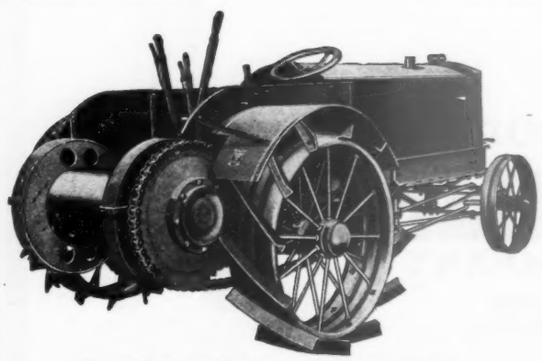

Rock Island Model 70 Tractor Winch

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specific fuel consumption. These curves were plotted originally to show the changes in power and specific fuel consumption which result from changes in compression ratio. They are included in this report as evidence that the fuels used at each ratio were satisfactory in preventing serious preignition and detonation. Had such not been the case the curves probably would have shown abrupt changes in curvature.

Figure 7 shows the percentage of motor benzol required at various compression ratios, based upon the results of this particular group of tests. With another benzol or another type of engine or under different conditions the percentages of benzol required vrey probably would be different. Nevertheless the figure gives a general idea of the changes in benzol content that are likely to be necessitated by a given change in compression ratio. No attempt was made to use a blend with the 11.5 ratio but it is evident from the figure that a blend containing a small amount of gasoline would have been satisfactory.

The amount of power developed when using benzol, gasoline, or a blend of the two is very nearly the same, provided there is in no case serious preignition or detonation. One would expect a slight increase in specific fuel consumption with each increase in the benzol content of the blend inasmuch as the calorific value of motor benzol is somewhat less than that of gasoline. While some of the multi-cylinder engine tests have shown tendencies in this direction, the differences have been small. No evidence of this tendency was noted in the single-cylinder engine tests whose results are given in Figures 5, 6 and 7.

From the results of these tests and from such other information as is available it appears that blends of motor benzol and gasoline are reasonably satisfactory with respect to distillation range, latent heat of evaporation, viscosity, and rate of flame propagation. Maximum power was obtained with approximately the same spark advance regardless of whether the fuel employed was gasoline, benzol, or a blend of the two. This indicates that under engine conditions the rate of flame propagation is about the same for benzol as for gasoline.

Some of the "motor benzol" which is now being marketed is less satisfactory from the standpoint of corrosive action than aviation gasoline. This may be due to the lack of sufficient demand for benzol of this quality rather than to any serious difficulty involved in getting rid of the offending constituents. In this connection it is well to note that benzol is a solvent for certain substances which are unaffected by gasoline. One of the first consequences of its use in a system in which gasoline has been used previously, may be to rid the system of certain accumulated deposits. This sometimes clogs fuel lines, and carburetor jets, and causes the engine operator to believe that the fuel is highly corrosive, whereas the products are in reality the result of the cleaning action of the benzol.

Probably the chief objections to the use of "motor benzol" or blends of "motor benzol" and gasoline are that freezing points and separation temperatures are rather high. As those depend upon the grade of gasoline and the composition of the benzol, measurements made with one lot of motor benzol may not be even approximately correct for another lot, the constituents of which are in different proportions. The following data were obtained from measurements of several blends. Motor benzol A was obtained from a different refiner than motor benzol B. The X gasoline conforms to government specifications for Domestic Aviation Gasoline and the same grade was used in all the blends.

Table 1

40% benzol A	60% gasoline X	40% benzol B	60% gasoline X
—11°C	slightly milky	— 1°C	milky
—23°C	more milky	—27°C	very milky
—36°C	formation of solid	—29°C	formation of solid
30% benzol A	70% gasoline X	30% benzol B	70% gasoline X
—12°C	slightly milky	+ 1°C	milky
—32°C	milky	—34°C	formation of solid
—42°C	formation of solid	20% benzol B	80% gasoline X
20% benzol A	80% gasoline X		
—20°C	slightly milky	—24°C	slightly milky
42°C	formation of solid	—42°C	formation of solid

It is difficult to determine definitely what degree of "milkiness" is serious. Certain it is that a pilot would be reluctant to operate under conditions such that the blended fuel gave any indications of being abnormal in appearance or performance.

Ethyl Alcohol

The possibility of the extensive use of ethyl alcohol as a fuel for internal combustion engines has been frequently discussed. Its attractiveness consists in what might be termed its potential availability. In an emergency, it could be produced in practically unlimited quantities inasmuch as it is not dependent upon an exhaustible source of supply as are petroleum products. Such a course, however, would reduce the amount of food products and its economic soundness is open to question.

It has also been known for a long time that ethyl alcohol can be employed satisfactorily with compression ratios much higher than are permissible with gasoline as a fuel. Its low calorific value and consequent high specific fuel consumption, however, have tended to prevent its adoption for aviation work. Another objection to its use is that starting is more difficult than when gasoline is the fuel. These objections are met to some extent by blending with gasoline, using only as much alcohol as is necessary to give the desired antiknock value. If alcohol is to be blended with gasoline its water content must be very low unless an additional blending agent is used, and until a few years ago the cost of large quantities of alcohol of the desired freedom from water would have been prohibitive.

Figures 8, 9 and 10 show results of tests made at the Bureau of Standards. These received support from the same sources as the benzol tests and were conducted in much the same fashion. Ordinarily the amount of alcohol in the blend was just sufficient to prevent serious detonation. Alcohol alone, however, was used in one group of runs at the 5.4 compression ratio. A comparison of this group of runs with those made with gasoline as a fuel shows the high specific fuel consumption which the use of alcohol entails. Figure 9 is based upon the data given in Figure 8 and shows that a minimum specific fuel consumption is obtained at a compression ratio of about 7. At higher ratios, the amount of alcohol which it is necessary to use in the blend in order to obtain satisfactory operation is so great that its low calorific value over balances the decrease in specific fuel consumption in pounds per horsepower hour which results from the increase in expansion ratio.[20] It should be observed that the indicated mean effective pressure continues to increase with increase in ratio up to the highest ratio enployed. For this reason it might prove desirable for certain classes of service, in short flights for example, to employ a high compression ratio and use alcohol as a fuel in spite of the high specific fuel consumption which would be entailed. Before leaving Figure 9 it should be pointed out that this figure does not show the effect of a change in compression ratio alone but this effect superimposed upon the effect of a change in blend proportions. Had alcohol alone been used as fuel there would have been a decrease in specific fuel consumption with each increase in ratio.

Figure 10 shows the percentages of alcohol required under the conditions of these tests. As was mentioned in the discussion of the benzol-gasoline blends, somewhat different percentages are likely to be required with engines of other types or under different conditions of operation. Nevertheless the figure gives a

[20] In conventional engines, compression ratio and expansion ratio are equal.

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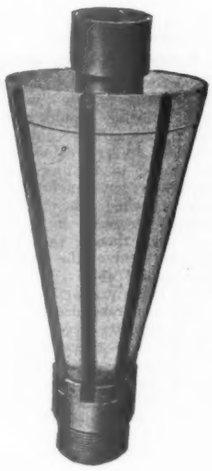
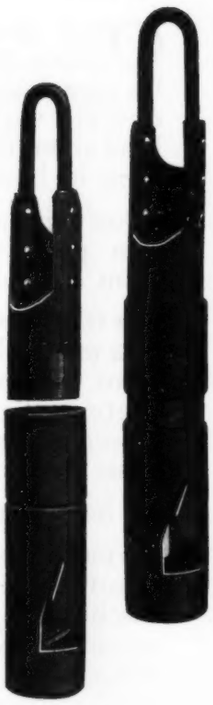


Prestige



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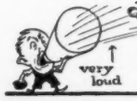

a forging is something more than a piece of hammered steel

CHAMPION DROP FORGINGS

general idea of the change in alcohol content likely to be necessitated by a given change in ratio.

In these tests some difficulty was experienced in starting the engine when alcohol alone was used as a fuel. This was probably due to the absence of low boiling point constituents, the boiling point of alcohol being about 78 degrees Centigrade. No such difficulty was encountered in the use of the alcohol-gasoline blends and the alcohol itself was entirely satisfactory after the engine had been in operation a few minutes.

Inasmuch as the latent heat of evaporation of alcohol is much higher than that of gasoline, it would probably prove desirable to heat the charge to a greater extent when using alcohol than when using gasoline. Ricardo[11] emphasizes the influence which the high latent heat of evaporation has upon the volumetric efficiency of an engine. As has been stated he found that with alcohol enrichment of the mixture far beyond the point at which maximum power would normally be expected gave an increase in power. This he attributed to an increase of volumetric efficiency brought about by an increase in the amount of heat withdrawn from the charge in the vaporization of the alcohol. No such effect, however, was noted in the tests discussed in this report.

There were no indications of excessive corrosion due to the use of the alcohol but the tests were not sufficiently extensive to give conclusive evidence in this respect. As is the case with benzol, alcohol acts as a solvent for certain substances not affected by gasoline. When employed in a system previously used for gasoline foreign matter may be dislodged and clog fuel lines, or strainers. This occasionally is attributed to the corrosive action of the alcohol when in reality it is a result of its cleaning action.

With alcohol a somewhat greater spark advance was required than with aviation gasoline. This would indicate that the ignition velocity of alcohol is somewhat less than that of gasoline. The difference, however, is probably too slight to influence the performance appreciably.

The freezing point of alcohol is below -100 degrees Centigrade, well below any temperature likely to be encountered in flight. With blends of alcohol and gasoline the situation is much less attractive although those would offer no difficulty if the alcohol were free from water and remained so. Unfortunately, however, alcohol has a strong tendency to absorb water from its surroundings and its miscibility with gasoline decreases with such absorption. After a study of the various factors influencing the stability of gasoline-alcohol-water mixtures, it was concluded that the minimum temperature of complete solubility increases

(1) with increasing water content
(2) with increasing gasoline content
(3) with increasing gravity of gasoline.

Other investigators have found it possible to diminish materially the minimum temperature of complete solubility by adding small percentages of certain substances such as benzol and ether.

Tests on the rate of absorption of water by gasoline-alcohol-water mixtures indicate that this rate increases

(1) with decreasing water content of mixture,
(2) with increasing alcohol content of mixture,
(3) with increasing humidity.

Results of miscibility tests are shown in Figures 11 and 12. The alcohol as originally received was 99.9 per cent, the gasoline, an aviation gasoline whose distillation characteristics are given in Figure 13. Figures 11 and 12 are both based upon the same data, the abscissae in one being the percentage of water in the mixture and in the other the percentage of water in the alcohol. Obviously when alcohol-gasoline blends are employed special precautions should be taken to keep the fuel free from water. This unquestionably is an objection to the use of these blends. If, however, they should be employed extensively it is probable that little difficulty would be experienced in effecting a considerable reduction in the amount of water that ordinarily finds its way into storage and service tanks.

Separation of the blend constituents is most likely to take place at high altitudes because of the low temperatures which prevail there. When separation does take place, alcohol being the heaviest constituent, will be used first. As the alcohol is the antiknock constituent serious consequences are likely to result when the airplane reaches low altitudes if the alcohol content of the blend has been reduced. Even at high altitudes considerable difficulty might be experienced in engine operation since for operation with alcohol alone the fuel orifice should be larger than for operation with alcohol-gasoline blends.

Special Antiknock Constituents

From time to time it has been claimed that material changes in the performance of gasoline would result from the addition of small percentages of certain substances. Very frequently these claims have proved to be unwarranted. It is known, however, that there are certain substances which when added to gasoline materially decrease its tendency to detonate even though they constitute but 1 or 2 per cent of the mixture.

Mention of this type of antiknock agent is made primarily to call attention to their apparent decrease in efficiency when it becomes necessary to use them in rather high percentages in order to meet the demands of extremely high compression ratios. The following table which is based on the work of Midgley[12] will serve as an illustration.

TABLE 2
Alcohol-Kerosene Blend

Alcohol by volume per cent	Kerosene by volume per cent	Determined Equivalent. Xylidine in Kerosene, by volume per cent
15	85	2.30
25	75	4.60
35	65	7.20
50	50	12.60

The last column shows the percentage of xylidine which must be added to kerosene to give the same antiknock characteristics as are obtained by the addition of the percentages of alcohol which are shown in the left-hand column. One might expect that if 2.30 parts of xylidine gives kerosene the same antiknock value as 18 parts of alcohol, then

$$\frac{2.30}{15} \times 50$$

parts xylidine should give the same antiknock characteristics as 50 parts of alcohol.

$$\frac{2.30}{15} \times 50 = 7.7$$

whereas the table shows 12.6 parts of xylidine to be necessary. This can be explained partially by the fact that with the alcohol-kerosene blend when the percentage of the knock-suppressing constituent has been increased from 15 to 50, then there is only

$$\frac{50}{85} \text{ or } 50\%$$

as much of the constituent whose knock is to be suppressed. With the xylidine-kerosene mixture there is

$$\frac{87.3}{97.4} \text{ or } 90\%$$

as much of the constituent whose knock is to be suppressed. It is evident that one should guard against overoptimism in estimating the probable performance of an antiknock agent of this type in an engine of extremely high compression ratio.

One example will serve to illustrate the great value of an antiknock agent of the type described. At the present time most aviation engines employ a compression ratio which permits full throttle operation with aviation gasoline without serious detonation. Occasionally a pilot finds himself where aviation gasoline is not available and is forced to use the grade ordinarily supplied to motor cars. This is likely to result in severe detona-

[11] "Recent Research Work on the Internal Combustion Engine," by H. R. Ricardo. "Transactions of the Society of Automotive Engineers," Volume 17, 1922, Part I, Page 1.

[12] "Journal of the Society of Automotive Engineers," June, 1922.

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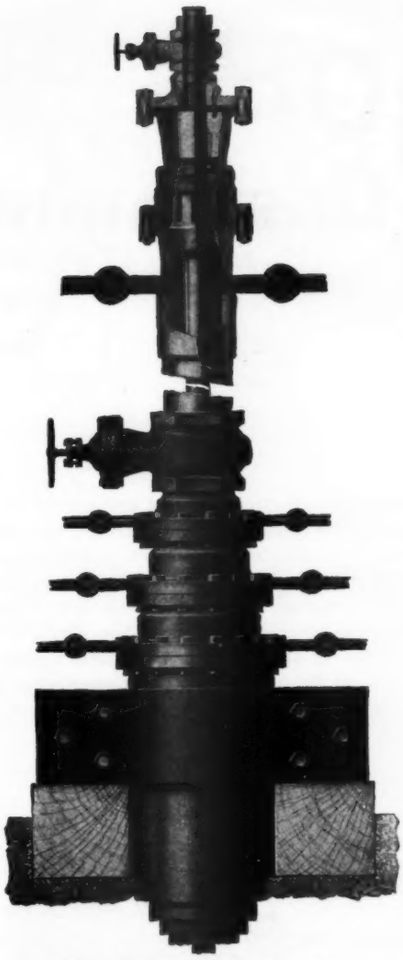

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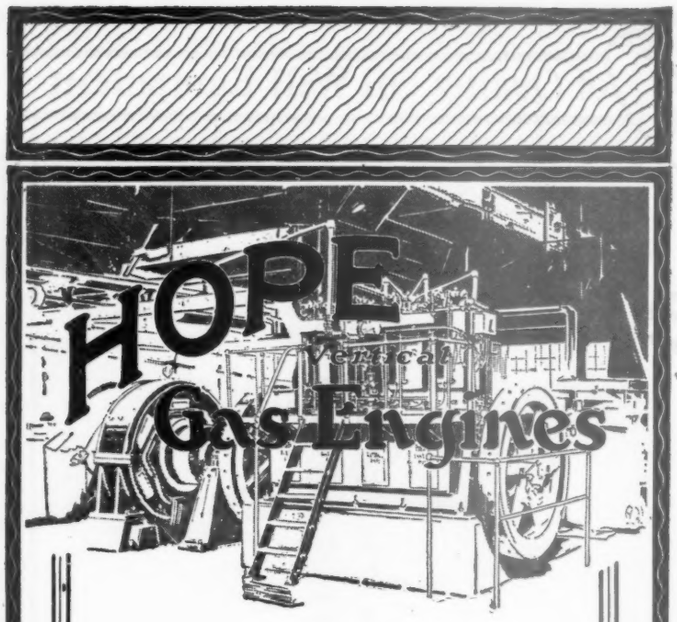

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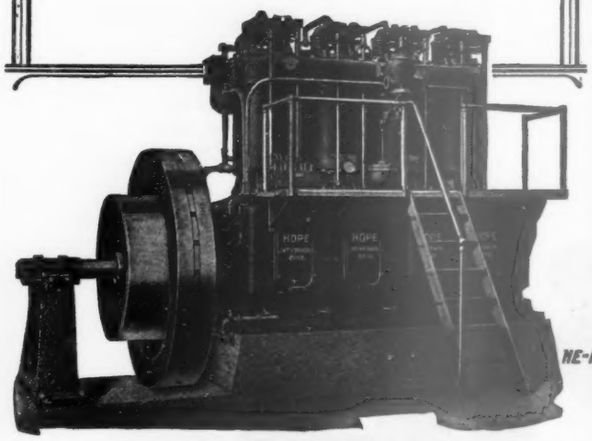

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tion and its consequences may prove serious. It is entirely feasible, however, for the pilot to carry a small amount of one of these very effective antiknock agents and be prepared for such an emergency.

Conclusions

Much progress has been made in the development of fuels for high compression engines. In further efforts along this line it should be borne in mind that freedom from detonation does not necessarily give freedom from preignition. It moreover should be realized that although a fuel possesses satisfactory characteristics from the standpoint of preignition and detonation, it is not a suitable fuel for high compression engines unless it is satisfactory with respect to the other qualities which have been discussed.

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SUBMARINE PIPE LINES AT OUTSIDE PORTS

(Continued from Page 94)

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RECEIPTS OF CALIFORNIA OILS; PETROLEUM IMPORTS IN DECEMBER

Receipts of California crude and refined oils at Atlantic and Gulf Coast ports for the month of December totaled 2,533,000 bbls., a daily average of 81,710 bbls., compared with 1,863,000 bbls., a daily average of 62,100 bbls. for the month of November.

Receipts at Atlantic and Gulf Coast ports for the week ended January 2 totaled 416,000 bbls., a daily average of 59,429 bbls., against 643,000 bbls., a daily average of 91,857 bbls. for the week ended December 26.

CALIFORNIA OIL RECEIPTS AT ATLANTIC AND GULF COAST PORTS
(Barrels of 42 gallons.)

At Atlantic Coast Ports—	Total December	Total November	Wk. Ended Jan. 2	Wk. Ended Dec. 26
Baltimore	193,000	*234,000	75,000	.....
Boston	304,000	292,000	.....	.....
New York	809,000	442,000	255,000	75,000
Philadelphia	626,000	400,000	86,000	383,000
Others	300,000	*314,000	.....	185,000
Total	2,232,000	1,682,000	416,000	643,000
Daily average	72,000	56,067	59,429	91,857
At Gulf Coast Ports—				
New Orleans and Baton Rouge	150,000	.....	.....	.....
Port Arthur and Sabine district	151,000	156,000	.....	.....
Tampa	.....	25,000	.....	.....
Total	301,000	181,000	.....	.....
Daily average	9,710	6,033	.....	.....
Total Atlantic and Gulf Coast ports	2,533,000	1,863,000	416,000	643,000
Daily average	81,710	62,100	59,429	91,857

*Revised.

According to figures collected by the American Petroleum Institute, imports of crude and refined oils at the principal ports for the month of December totaled 5,023,000 bbls., a daily average of 162,032 bbls., compared with 5,107,000 bbls., a daily average of 170,233 bbls. for the month of November.

Imports at the principal United States ports for the week ended January 2 totaled 1,292,000 bbls., a daily average of 184,572 bbls., compared with 727,000 bbls., a daily average of 103,857 bbls. for the week ended December 26.

IMPORTS OF PETROLEUM AT UNITED STATES PORTS
(Barrels of 42 gallons.)

At Atlantic Coast Ports—	Total December	Total November	Wk. Ended Jan. 2	Wk. Ended Dec. 26
Baltimore	397,000	587,000	125,000	.....
Boston	637,000	130,000	65,000	65,000
New York	1,104,000	1,419,000	424,000	196,000
Philadelphia	467,000	304,000	113,000	95,000
Others	838,000	1,036,000	65,000	133,000
Total	3,443,000	3,476,000	792,000	489,000
Daily average	111,065	115,867	113,143	69,857
At Gulf Coast Ports—				
Galveston district	407,000	391,000	93,000	*83,000
New Orleans and Baton Rouge	787,000	821,000	168,000	155,000
Port Arthur and Sabine district	215,000	233,000	164,000	.....
Tampa	171,000	186,000	75,000	.....
Total	1,580,000	1,631,000	500,000	238,000
Daily average	50,967	54,366	71,429	34,000
At All United States Ports—				
Total	5,023,000	5,107,000	1,292,000	727,000
Daily average	162,032	170,233	184,572	103,857

*Revised.

MUST PAY TAX ON OIL FROM LAND OF INDIAN

OKLAHOMA CITY, Jan. 9.—That oil companies must pay gross production tax on oil produced from land owned by an Indian and purchased with money derived from the sale of Indian land, in effect, the decision of Judge J. H. Cotteral, it was learned at the attorney general's offices here.

The Bigson-Zahniser Oil Co. paid part of the gross production tax to the State auditor. The tax was from land owned by Miller Tiger, an Okfuskee county Indian. Tiger had sold the headright and had used the money to purchase the second piece of land.

The oil company sought to recover the tax it had paid, alleging that Indian land was not taxable, and that the oil produced from it was not taxable. The company contended that although the land was not the original Indian land, it had been bought with money from the sale of the headright.

Judge Cotteral sustained the demurrer to the suit filed by the attorney general. More than $20,000 was involved in the suit.

Discussion of Judge Cotteral's decision was taken up from every angle at a called meeting by the Osage Oil & Gas Lessee's Association at the Mid-Continent Oil & Gas Association headquarters and the following committee was appointed to consider the action and represent the Osage operators in an appeal if one is deemed necessary: Judge James B. Digges, L. G. Owens, W. C. Franklin, J. C. Denton and J. H. Brown. A report will be made to the Osage association between January 15 and February 1.

OKLAHOMA SERVICE CO. BUYS SAYRE FIELD GAS

OKLAHOMA CITY, Okla., Jan. 9.—Sale of the Coogan gas properties in the Sayre Field to the Oklahoma Service Co., Inc., of Wichita Falls, Tex., was announced here. The consideration was $101,000, according to W. F. Holleman, general counsel of the Oklahoma Service Co.

The Coogan gas properties include a 40-acre producing tract and daily gas production of approximately 40,000,000 feet, the gas supply for the towns of Sayre, Carter and Elk City, Okla. The deal increases the Oklahoma Service Co.'s total gas-producing capacity in the Sayre and Mangum Fields to about 100,000,000 feet daily, and adds Sayre, Carter and Elk City to the group of towns and cities in southwest Oklahoma now being supplied with gas by the Oklahoma Service Co. system.

The company's lines extend from Sayre to Altus, with branches into adjacent territory, including about 60 miles of gas mains connecting 15 towns, cities and gas using communities. W. R. Duke of Wichita Falls is president.

KENTUCKY PRODUCTION DURING NOVEMBER, 1925

By T. S. Scott

Secretary Kentucky Oil Men's Assn.

Production of crude petroleum in Kentucky during November, 1925, was as follows:

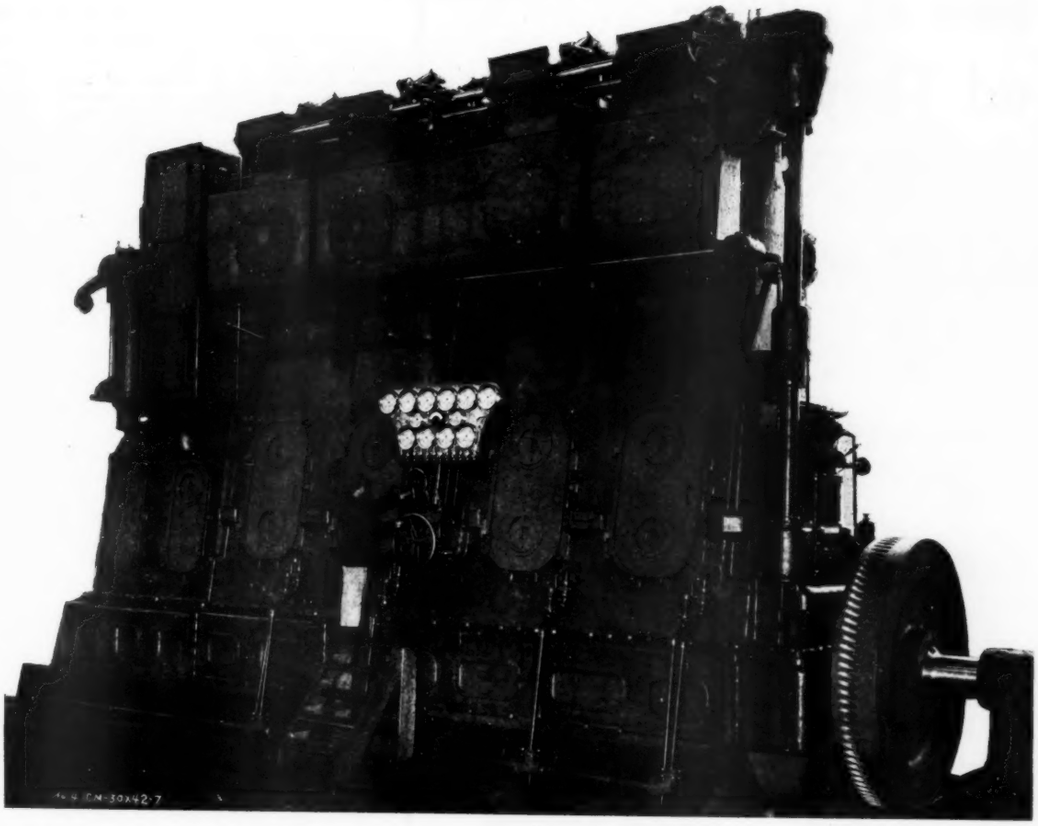
lows:

Allen	20,973.59
Barren	25,044.58
Bath	1,625.40
Clinton	1,684.86
Cumberland	4,488.75
Daviess	2,078.69
Elliott	705.90
Estill	33,546.45
Floyd	674.56
Hancock	2,401.37
Hopkins	1,901.28
Jackson	78.96
Johnson	82,471.46
Lawrence	56,087.93
Lee	133,581.60
Logan	127.46
Magoffin	67,298.26
McCreary	311.54
Menifee	136.93
Monroe	1,289.87
Morgan	761.42
Ohio	16,798.89
Owsley	1,507.69
Powell	16,552.18
Simpson	555.54
Warren	31,864.08
Wayne	3,768.68
Wolfe	3,921.40

LARGE DIESELS FOR REFINERIES—

This is a marine engine being furnished to Standard Oil Co. (N. J.) for converting their 15,000 ton tanker "E. T. Bedford" from steam to Diesel engine drive.

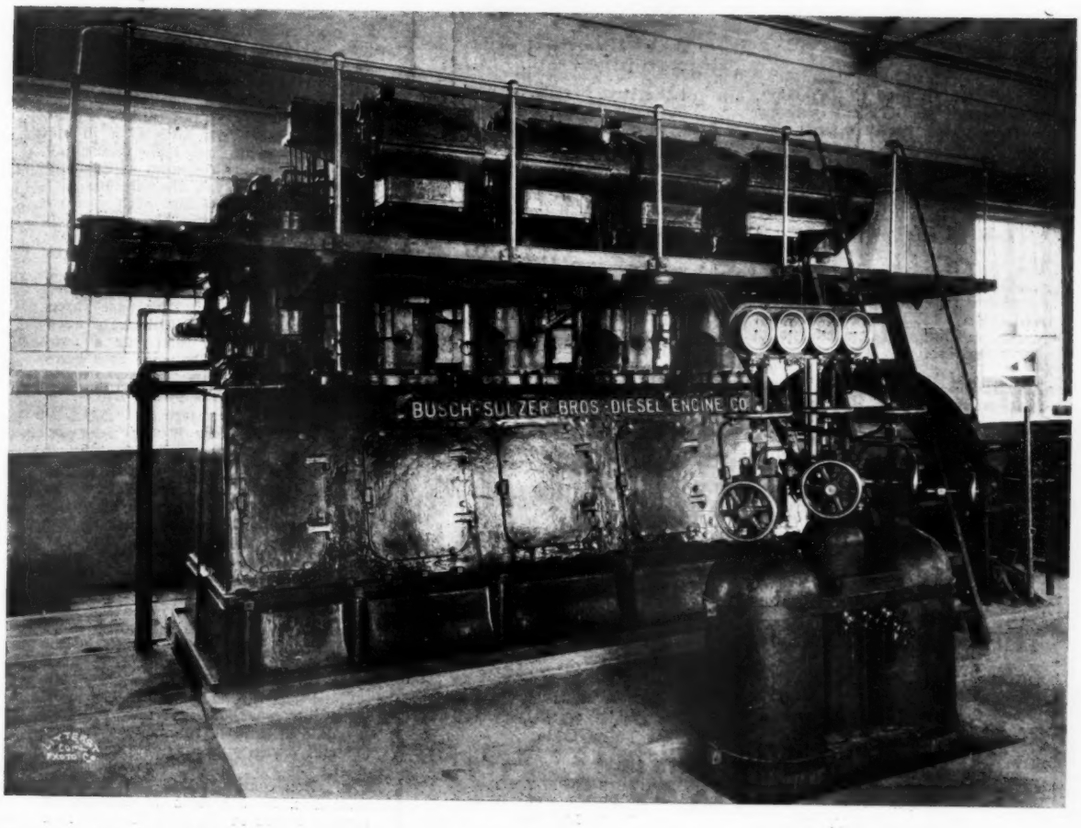
It is also made for generator drive and will carry 2500 B. H. P. or 1725 KW load and produce 475 KW. Hrs. per barrel of fuel oil consumed. A low grade fuel is suitable.



SMALLER DIESELS FOR PIPE LINE PUMPING—

We have sold 95 engines for driving main line pumps similar to the 400 BHP unit shown here.

They are of a thoroughly tried out design, built of materials which we have found best for the purpose in our own experience of 27 years building Diesel engines in this country.



BUSCH-SULZER BROS.-DIESEL ENGINE COMPANY, ST. LOUIS, MISSOURI

Here at Last---
and They DO LAST
SARGENT'S
SECO AND ALLOYED
VALVES

(Patents Pending)

NON-CORROSIVE—NON-MAGNETIC

Screw Seat with Plumb Bob

Screw Seat with Ball

In the manufacture of the New SECO and ALLOYED Valves we have spared neither time nor money in making them the BEST—to meet the requirements that we claim for them—that is, NON-CORROSIVE and NON-MAGNETIC. THEY WILL NOT STICK.

The SECO is made of tough steel. It is acid-resisting, non-corrosive and non-magnetic. The ALLOYED is made of alloy metal and is acid-resisting and non-corrosive.

The SECO can be had in Screw Seat with Ball or Plumb Bob, while the ALLOYED can be had in Plumb Bob only, but can be used with the SECO Seat.

The condition of the well determines which one should be used to get the best results, although the SECO and ALLOYED Valves will work in any well, and if the fluid is there they will increase production.

We also manufacture other seats, plumb bobs and balls of good grade tool steel, either hard or soft.

Our Screw Seats have a feature worthy of your consideration. They will not become loose or leak around outside of seat. They come in regular and oversize oil passage.

These Oversize Valves give a 2-inch Pump the same valve capacity as a 2½-inch Pump, a 2½-inch pump the same capacity as a 3-inch Pump, etc. Our Screw Seats are Reversible, as shown in illustration.

THE PERCENTAGE OF INCREASED PRODUCTION MERITS INVESTIGATION

For Particulars Address

THE SARGENT ENGINEERING CORPORATION

P. O. Box 95 **Huntington Park, Calif.**

Plant:
2533 E. 56th St.,
Los Angeles, Calif.

Branch:
214 W. 1st St.,
Tulsa, Okla.

REPRESENTATIVES:

CASPER SUPPLY CO., Casper, Wyo.
REPUBLIC SUPPLY CO., El Dorado, Ark.
HERCULES SUPPLY CO., Corsicana, Texas
R. J. MILLER CO., Houston, Texas

VERY ACTIVE YEAR IN DRILLING IS EXPECTED BY THE PIPE MILLS

By B. E. V. Luty

PITTSBURGH, Pa., Jan. 11.—Since the turn of the year there has been a slight increase in the volume of new buying in steel products, with a marked increase in the volume of specifications against contracts.

The turn has occurred in tubular goods as in steel products generally. By no means is there what there would be called active buying, in either oil country goods of merchant pipe, but the trend towards greater activity is distinctly marked.

In past years there was almost always a marked tendency for jobbers in tubular goods to stock up immediately after completing the January 1 inventory. There was such a stocking up, or at least a general replenishment, a year ago. There is much less tendency now in that direction. The altered attitude is due to experiences of the past year in prompt deliveries by mills and in very efficient handling of movements by the railroads. Jobbers do not feel that there is any necessity for carrying stocks of any size, as they can secure deliveries as desired. Some replenishment, however, is in order, for stocks, according to the testimony of mills, were reduced to almost nothing last year, and a jobber needs a well assorted stock even though not a large stock.

Expect Prices to Hold

Jobbers have no particular concern as to prices of tubular goods. The present lists were issued in April, 1923, representing the culmination of several advances, and the natural expectation was that the next change would be a decline in prices. That was natural enough, but nearly three years have now elapsed without the next change occurring. When pipe prices did not decline while various other finished steel products were declining, there is no reason to expect them to decline now, when the other lines are firm and some of them have advanced in the past three months.

The pipe mills expect 1926 to be a very active year in drilling, reaching the conclusion by observance of the statistical facts of production, stocks and prices, while consumption is expected to hold or increase. As to line pipe in 1926, there are no definite predictions. Naturally the mills expect more business in gas lines than in oil lines, that having been their recent experience. Gas lines represent much more tonnage per mile than the oil lines.

Steel mill operations last week were at slightly higher rate than the average of November and December, according to current accounts, but the difference is not consequential, the main point being that there is no indication of a decrease, and mill operations in the past three months were such that if the rate were continued throughout this year a new tonnage record would be made by a margin of 5 to 10 per cent. Last year made a new record in steel production, by a trifling amount.

Prices Very Steady

Finished steel prices are very steady all along the line. They do not show any definite advancing tendency. At times in the past, with a similar demand, mills would probably have attempted to put up prices, but their experience of a year ago, when they made various advances only to see the advances lost before there was much buying, has led them to take a very conservative view now in the matter of prices, and there will be no effort to mark prices up. There will be an open trading market and if prices work up of their own accord the mills will consider this safe and sound. The probability, of course, is that they will not, as while demand is running very heavy the mill capacity is ample to take care of it.

Pig iron continues dull and firm. In general there has been a decrease in furnace stocks in the past three or four months, while consumption has been increasing, probably more than production.

Connellsville coke has sagged off somewhat, since its pre-holiday bulge, but is still at rather a high level. Sales are chiefly to eastern distributers. The blast furnaces are practically out of the coke market, being covered for the current quarter by contracts averaging about $4. Spot coke is $4.75 to $5 and prepared coke for domestic use $7 to $8, according to grade.

EMPLOYES STOCK PLAN OF IMPERIAL OIL, LTD.

By Victor Lauriston

CHATHAM, Ont., Jan. 9.—Among the interesting industrial experiments launched some years ago by Imperial Oil, Ltd., of Toronto was a co-operative investment trust, designed to enable its employes to become stockholders. The first investment trust was closed last April, the stockholders secured thereby being duly turned over, outright, to the beneficiaries.

Sufficient time has now elapsed in the estimation of the directors of Imperial Oil, Ltd. to show that the employe-shareholders are, with rare exceptions, continuing as stockholders of the company; and very few indeed have disposed of their holdings. As a result of this encouraging showing, the second co-operative investment trust has been launched, commencing January 1, 1926, and to run for three years.

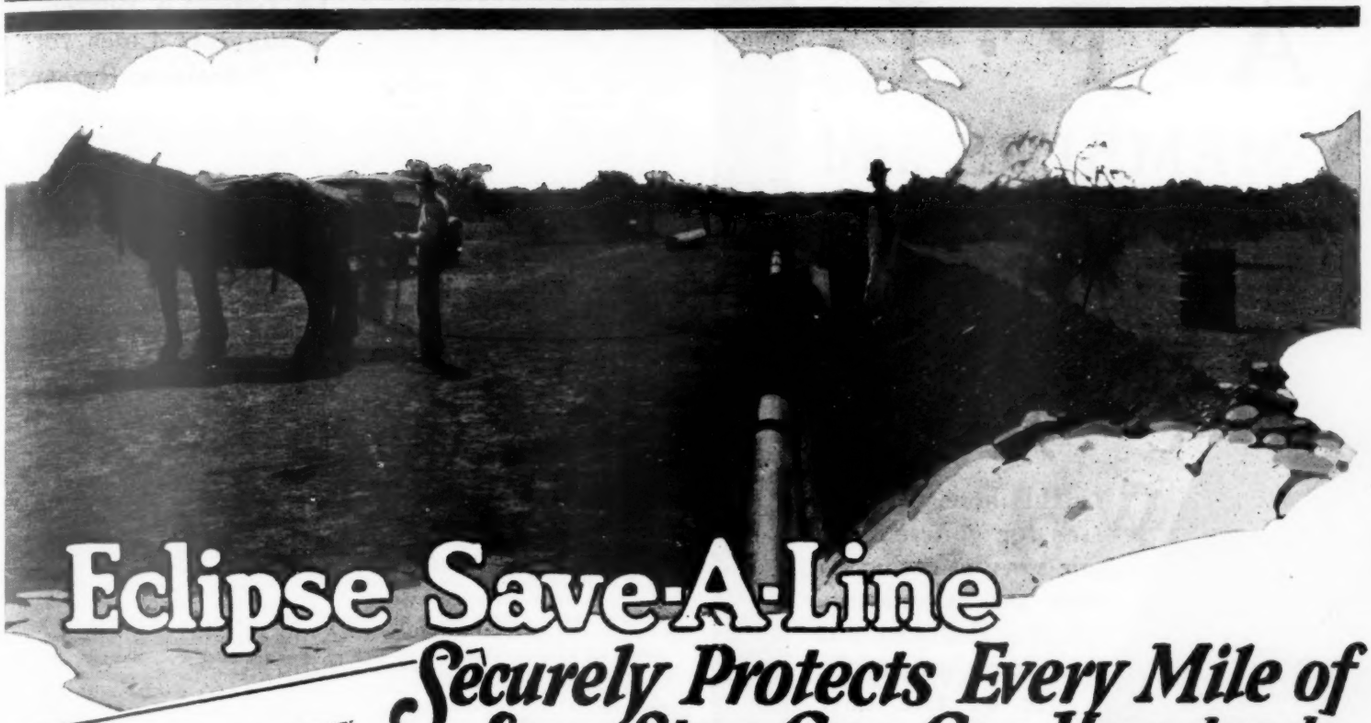
The trust will be conducted and the funds invested under a board of five trustees selected by the directors of Imperial Oil, Ltd., the trustees being Victor Ross, C. T. Griggs, Percy Kitson, Thos. S. Palin and John C. Hampton; all operating expenses of the trust being, incidentally, borne by the company.

Any employe of the company or of its subsidiaries whose continuous service exceeds one year and who may be regarded as a permanent employe may participate in the trust, by depositing for 12 consecutive months during the three years specified an amount not to exceed ten per cent of his annual compensation from the company, deposits being in equal installments, payable monthly or semi-monthly or on such dates as the trustees may fix, and being in even dollars or half-dollars. The trust is also open to any employes who later attain one complete year of service.

Employes who have parted with ownership of more than one-third of their holdings under the first co-operative investment trust are ineligible to participate for a period of one year, and no employe shall commence participation for the first time after June 30, 1928.

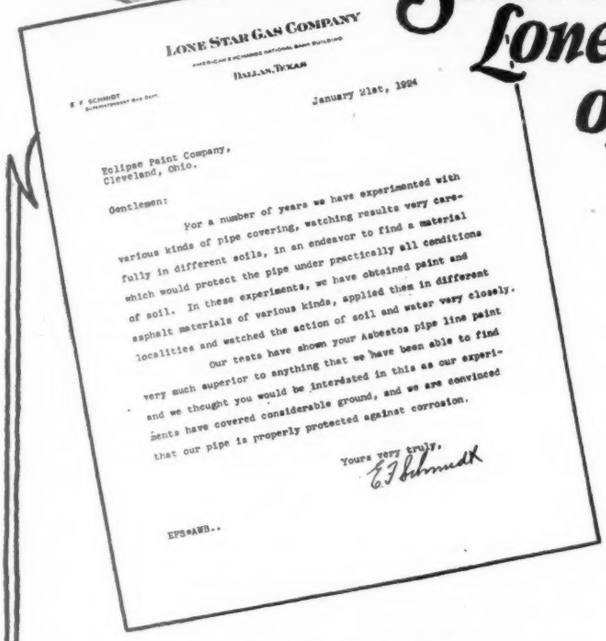
The company supplements the amount paid in by employes to the extent of 50 per cent additional; the trustees investing the entire deposits in the stock of the company, all dividends being added and re-invested. Should any employes withdraw or forfeit their stock rights by non-payment of their installments, all moneys accruing shall enure to the benefit of the remaining employe-depositors; but where forfeiture occurs, the amount actually paid in by an employe, plus 6 per cent interest, will be repaid him in cash.

An employe who is still a depositor at the completion of the trust will receive his stock outright; any uninvested balance will be paid him in cash. An employe who leaves the service before completion of the trust shall receive his total deposits plus 6 per cent interest; and an employe who remains in the service may likewise withdraw his deposit plus six per cent, but is ineligible to again participate for a period of one year. The trustees will, however, assist any employe to prevent forfeiture, and have power to suspend deposits where sickness or other adverse conditions warrant. A depositor who retires from the service under the provisions of the annuity plan of the company, or to take employment with any subsidiary company, or with a company allied with Imperial



Eclipse Save-A-Line

Securely Protects Every Mile of Lone Star Gas Co.s Hundreds of Miles of Pipeline



LONE STAR GAS COMPANY

DALLAS, TEXAS

January 31st, 1924

Eclipse Paint Company,
Cleveland, Ohio.

Gentlemen:

For a number of years we have experimented with various kinds of pipe covering, watching results very carefully in different soils, in an endeavor to find a material which would protect the pipe under practically all conditions of soil. In these experiments, we have obtained paint and asphalt materials of various kinds, applied them in different localities and watched the action of soil and water very closely.

Our tests have shown your Asbestos pipe line paint very much superior to anything that we have been able to find and we thought you would be interested in this as our experiments have covered considerable ground, and we are convinced that our pipe is properly protected against corrosion.

Yours very truly,

E. F. Schmidt

EFS:AWB..

The Lone Star Gas Company, Dallas, Texas, is known throughout the industry as an exceptionally shrewd and careful buyer. Therefore, the fact that they definitely selected SAVE-A-LINE for protecting their pipe lines against corrosion, *after numerous severe tests were made* by their pipe line construction department, is a noteworthy testimonial of superiority.

Eclipse SAVE-A-LINE forms a thick, elastic film or coating, reinforced with asbestos fibre, which contracts and expands with the pipe and is unaffected by moisture, alkali, lime or electrolysis. It can be applied without heating and by inexperienced labor.

Let us know your requirements. We will be glad to send you sample and quote you prices. If you have any particular difficulties peculiar to your soil or climate, our Service Department is at your disposal.

A Few of the Larger Users of Save-A-Line

The Shell Company, The Gulf Pipe Line Company, Associated Pipe Line Company, Humble Pipe Line Company.

Their experience is your Guarantee of satisfaction.

The Eclipse Paint & Mfg. Co.

Cleveland, Ohio, U.S.A.

DALLAS DENVER SAN FRANCISCO NEWARK
PHILADELPHIA

A·P·I·

MEMBERS and FRIENDS——

Welcome to California!

WHILE here, why not see for yourself the whole story of coring... from the manufacture of the drills in our modern plant, to the use of the core barrel in the well. It will be interesting, and of course, without obligation of any kind. Just call any of the numbers below and we'll make arrangements to suit your convenience.

SPENGLER
COMPLETE CORING SERVICE AVAILABLE EVERYWHERE

SPENGLER
CORE DRILLING COMPANY
Main Office and Plant:
12901 SO. MAIN STREET., STATION H. TEL. COMPTON 1152 and 1301
LOS ANGELES
TAFT, CALIFORNIA, PHONE 81-W

Oil, Ltd. will receive the full amount of stock to which he is entitled, and the balance in cash; and this provision may be extended by the trustees to depositors leaving the service through no fault of their own and for reasons satisfactory to the company. In case of death an employe's estate will receive his stock, any uninvested balance being paid in cash. Commission agents, under certain conditions, are eligible to participate.

Of the trustees, three are officers or directors of the company, and two are employe-depositors, not officers or directors.

In the annuity and benefits plan of the company the maximum death benefit has been raised to $3,000 for 5 years' employe service, and to one year's full pay, without minimum, if the employe has had not less than ten years' service. In all cases of annuitants whose annuities are granted after this amendment has become effective, on December 9, 1925, death benefits shall be 12 times the monthly annuity, but in no case less than the amount previously payable.

CALIFORNIA STUDENTS STUDY OIL PROBLEMS

About 45 per cent of the students registered in the College of Mining at the University of California are following the petroleum option. In addition to the prescribed undergraduate curriculum all students are assigned during the summer months in acquiring first-hand knowledge of field conditions in the several petroleum districts of California. Research work into the many and varied problems confronting the industry is being diligently prosecuted at all times and many graduate students are investigating obscure phases, both of the oil pool and oil shale situations.

For the past two years studies have been in progress in the petroleum laboratories of the University of California on the influence of the different physical variables on the flow of oil through sands. These variables include the effect of gas pressure and gravity; the influence of porosity and grain size of the sand in determining pore friction, capillary action and retention of the oil by adhesion; the effect of oil viscosity on the resistance to flow. The influence of these fundamental variables is now well understood and considerable quantitative data have been secured indicating their relative magnitude as factors aiding or opposing drainage.

It is now planned to investigate some of the larger aspects of the oil field drainage problem in which these same elemental factors are involved. For this purpose a steel tank semi-cylindrical in form, 5 feet in diameter and 8 feet long, has been built, which is to be filled with tightly-packed sand, the pore space of which will be saturated with crude petroleum containing dissolved gas under pressure. The tank has been designed for pressure as high as 125 pounds per square inch and some of the pressure tests will be conducted under initial pressure approaching this figure. Provision is made for draining the oil from this tank through miniature wells, partly by natural flow of the oil while under pressure and partly by vacuum applied to the "wells" when the gas pressure is exhausted. Oil entering can be accurately measured. The sand can be sampled at numerous points through the tank shell. It is thought that all of the conditions prevailing in actual oil field operations may be simulated on a small scale in this apparatus.

It is proposed to use this apparatus in studying the effect of gas pressure, sand size, oil viscosity, ground temperature and diameter of wells on the radius of drainage of wells; the percentage recovery under different methods of extraction; and the influence of back pressure, well spacing and delayed development on ultimate recoveries. Opportunity will also be afforded for studying the flotative effects of water on oil in sand and the advantages of artificially restoring pressure to the oil after partial drainage has been effected and the natural gas pressure dissipated.

Dr. George A. Burrell Suggests Lines for Petroleum Research

Dr. George A. Burrell, of the Burrell Testing Laboratories, Pittsburgh, Pa., and secretary of the Petroleum Section of the American Chemical Society, stressed the desirability of differentiating between fundamental research and the lines of research from which quick results are anticipated, in his comment on the Rockefeller fund for research. In a statement to The Oil and Gas Journal Dr. Burrell says:

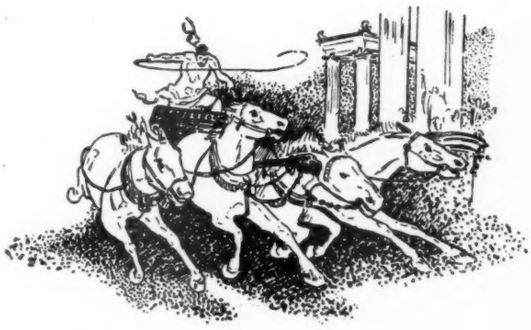
"I consider Mr. Rockefeller's gift a notable contribution fraught with great possibilities. The American Petroleum Institute is to be congratulated on securing the fund. It is the consummation of Dr. Manning's initial efforts of some years ago, when he left the Bureau of Mines with the avowed purpose of organizing a petroleum research program in the Institute. It is the first concrete step in the petroleum industry toward a common research organization. Other industries have them and find them exceedingly valuable.

"A fairly sharp line of division can be made between problems best handled by the industry and those to be worked out by a common research group. In the latter class can be mentioned the nature of the hydrocarbons in petroleum, both before and after processing oils. In other words what is the composition of petroleum? Paraffin base, asphaltic base and mixed base, terms tell us little. Without the slightest question of doubt there will come a time when we will make out of petroleum many other things besides fuel and lubricants. But not much will be accomplished along this line until the basic ingredients in petroleum are known. But a problem like this is no sinecure. Painstaking research of the highest order is necessary, and the results will be slow in coming. The industry can be forewarned that much time and cash can be easily consumed in making an impression on this kind of work.

"Other necessary work well performed with the research funds has to do with the correlation of the best data, extant on petroleum. I have reference for instance to heat exchange data, and the assembly of the most accurate physical and chemical constants, and their determination where necessary. We know little of the actual mechanism of adsorption in refinery, much still remains to be done on treating and on sulphur in oils. We do no evaluate motor fuels or lubricants in our testing methods, in any but an exceedingly loose and indefinite way. Amorphous wax is a problem to handle. Sludge acid is undoubtedly rich in useful substances if we could get them out. Cracking still residuums are almost a waste product. There are enough problems. The question will be to select a few on which some progress can be made.

"I foresee probably no new and startling developments from this research fund. In fact the results will be disappointing to many people who have had little to do with research work. The big developments some here and there from the four corners of the industry. Perhaps a Schultz working almost single-handed on vacuum distillation, a Sharples stepping into the industry from the outside and revolutionizing the dewaxing practice, Dubbs and Cross working alone at the start, a concerted although delayed movement to seize something from another industry, like the bubble tower development. The general use of tube stills largely because the Foster still is a good one and pushed by good hands. Manufacture of alcohols by a big research organization of the Standard Oil Co. of New Jersey, etc. Dunstan's and Brook's work on hypochlorite treating, and the contact process of decolorization. The latter was developed in California because it was needed there to make lubricants.

"The Rockefeller research work will probably proceed much like Government work. Little that is revolutionary comes

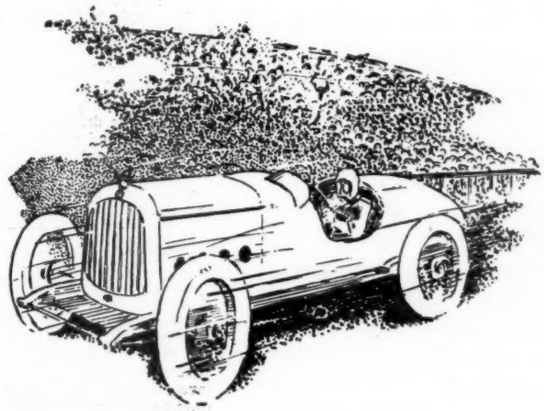


HORSE POWER

From the days when Ben Hur drove his four milk-white Arabians to a glorious victory, the advancement of civilization has depended upon horse power.

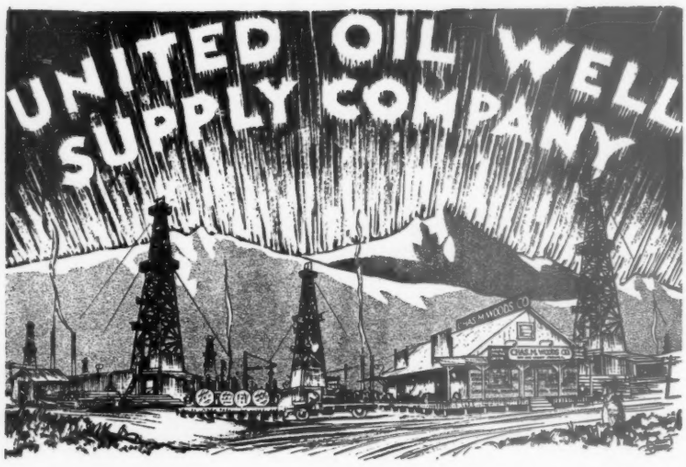
Then it was the question of super breeds of equine flesh, but today horse power means something differerent - it means modern gasoline motors, developed to the highest mechanical perfection.

These modern motors demand good gasoline. The best gasoline contains a large percentage of "Natural Gasoline", which gives it greater power and efficiency.



CHESTNUT & SMITH
CORPORATION

GENERAL OFFICES CHESTNUT & SMITH BLDG.
TULSA, OKLAHOMA.



A California Welcome to A. P. I. Members!

[Incorporating an announcement of a new firm—with a word to old friends]

AFTER many years of identification with the Petroleum Industry, the officers of the Chas. M. Woods Company announced the purchase of the company and its subsequent retirement from the oil well business, December 1, 1925. ¶ In its stead, operating the *same* facilities and directed by the *same* management, a *new* corporation, to be known as the United Oil Well Supply Company of California, will function. ¶ It is our sincere trust that the same pleasant relations with friends and patrons of the past, will continue . . . and that their good will and confidence will be *amply* repaid by a *better* and *greater* service. ¶ If there is any way in which we can help make the California visit of you members of the American Petroleum Institute and your friends, more enjoyable, we're yours to command.

UNITED OIL WELL SUPPLY CO.
OF CALIFORNIA
Executive Offices: 908 A. G. Bartlett Building—*Los Angeles*

Remember - formerly Chas. M. Woods Co. - *Now*

UNITED OIL WELL SUPPLY COMPANY

from the Government Bureaus. But we wouldn't want to do without them, the Bureau of Mines and Bureau of Standards say. They have demonstrated their great usefulness, and do things the industry does not do. Witness the motor gasoline survey, evaporation losses, mud laden fluid work, crude oil distillation, standardization work.

"But the new research fund should, in my opinion, be used for research much more fundamental than the Government bureaus. It has not been possible to do much of this kind of work therein. Congress and a portion of the industry too has to be satisfied with quick results, and a man painstakingly laboring for years on abstruse and academic research problems does not appeal to them."

INCOME FROM INTEREST PAID INDIAN WARDS

The income from interest paid by banks on deposits of funds of individual Indians under guardianship of the Government amounted to approximately $1,264,378 last year, it is announced by the Interior Department.

The total amount of money belonging to individual Indians and deposited in banks was $32,090,823. This is exclusive of tribal or other funds on deposit in the Treasury of the United States and drawing interest.

The average rate of interest earned through these deposits in banks was 3.94 per cent. Of the total amount of interest approximately $341,652 was paid by depositories for the Indians of the Osage tribe in Oklahoma; $273,536 by depositories for the Five Civilized Tribes in Oklahoma, and the balance amounting to $649,190 by depositories of individual members of other tribes.

Under the law the Secretary of the Interior, as guardian of the Indians, has the authority to deposit funds of individual Indians in National and State banks under certain conditions, to be secured by trust companies, drawing a fair rate of interest.

NEW EIGHT-INCH SIZE THREADING MACHINE

The Landis Machine Co., Waynesboro, Pa., has added to its line of pipe threading and cutting machines a new 8-inch size. This machine has a range of 2½-inch to 8-inch inclusive. Two die heads are employed for covering this range; one 4-inch head for a range from 2½-inch to 4-inch inclusive and an 8-inch head for a range from 4-inch to 8-inch inclusive. The entire range of each head is covered by but one set of chasers.

The travel of the carriage of this machine is 24¾-inch and it has eight speeds. The driving pulley is 14 inches in diameter and takes a 5-inch belt. The machine is 9 feet 3 inches by 4 feet 9¾ inches. It weighs, belt driven, 9,750 pounds and arranged for motor drive and equipped with motor, 10,500 pounds.

MAGNOLIA INCREASES CAPITAL

OKLAHOMA CITY, Okla., Jan. 9.—Following completion of the transfer of stock of the Magnolia Petroleum Co. and the Magnolia Pipe Line Co. to the Standard Oil Co., the two Magnolia concerns have given notice of increases in capital investment in Oklahoma. The petroleum company's increase is from $29,028,000 to $48,840,000 and the pipe line company's increase is from $13,140 to $6,307,200. The Central Producing Co. of Muskogee reports an increase of capital stock from $25,000 to $100,000.

NEW TYPE OF OIL BURNER

The Socony Burner Corp., which is understood to be controlled by Standard Oil Co. of New York, is conducting research work on a new type of industrial oil burner. With this burner, by partial combustion of the oil, sufficient heat is generated to break up the rest of the oil into a fixed gas which may then be burned just as coal or water gas.

DEEP WELL DRILLING DISCUSSED IN BOOK

A revised edition of "Deep Well Drilling," by Walter H. Jeffery, which was first edition of 'Deep Well Drilling' press of the Gulf Publishing Co., Houston, Texas. "During the few years that have elapsed since the publication of the first edition of "Deep Well Drilling" there have been so many improvements in well drilling methods and equipment that it was found necessary practically to rewrite the book for the second edition," the author states in the preface to this issue.

A list of the topics and subjects treated in this 662-page volume would cover nearly every item of information needed by the practical driller and operator from general oil geology to safety laws and camp sanitation, all of which is written in a clear, easily understandable style, and treated briefly but fully. Cable tool drilling, from rig specifications to underreaming and bit dressing; rotary and combination drilling by the hydraulic circulating system; casing methods; cementing casing; the use of packers; electrical drilling and pumping; shooting; and completing the well are but a part of the subjects treated comprehensively and in detail. Numerous tables of all kinds of useful information supplement the work, and hundreds of illustrations help to clarify the text.

The book sells for $6.

PRODUCTION TAX TEST UP TO SUPREME COURT

OKLAHOMA CITY, Jan. 9.—An opportunity for the State Supreme Court to interpret the law authorizing the collection of a 3 per cent gross production tax on crude oil and natural gas may arise out of a suit pending in the county court at Enid. The suit was brought by O. R. McComb, tax ferret, against the Mid-Continent Petroleum Corp. and the Sinclair Oil & Gas Co. and seeks to collect about $40,000 in ad valorem taxes held to be due under certain valuations of property of these companies. The Mid-Continent is charged with failing to pay taxes from 1919 to 1925 on properties valued at $100,000 and the Sinclair during the same period on properties valued at $200,000.

The properties are lease equipment which the oil companies contend are exempt from taxation under the gross production act.

OKLAHOMA CHARTERS

OKLAHOMA CITY, Okla., Jan. 9.—The Bovaird Oil & Gas Co. of Tulsa was incorporated recently with a capital stock of $100,000 by W. J. Bovaird of Independence, Kans., and R. M. McMahan and W. M. Bovaird of Tulsa. Charters were issued also to the Oklahoma Oil Jobbers Association, Oklahoma City, capital stock $1,000, incorporators C. M. Kinney, Secretary; Fred C. Young and E. F. Ross of Oklahoma City. The Quatro Petroleum Co. of Guymon, Okla., capital $5,000, incorporators Dr. T. B. Ross and others of Guymon. Rock Island Oil Co. of Duncan, capital $25,000, incorporators L. B. Simmons and others of Duncan. Barfield Petroleum Co. of Tulsa, capital $20,000, incorporators F. C. Barr and others of Tulsa. The American Oil Pump & Tank Co. of Ohio has been domesticated with a capital investment of $10,000.

TO REOPEN LOST HILLS

LOS ANGELES, Calif., Jan. 9.—The day before the merger of the Standard Oil Co. and the Pacific Oil Co. was announced the Associated Oil Co. issued an order closing its Lost Hills station and transferring the superintendent, clerk and gauger. The order was rescinded after the merger. After having been shut in three years, Lost Hills leases of the Standard Oil Co. and the General Petroleum Corp. producing light oil, have been put back on production.

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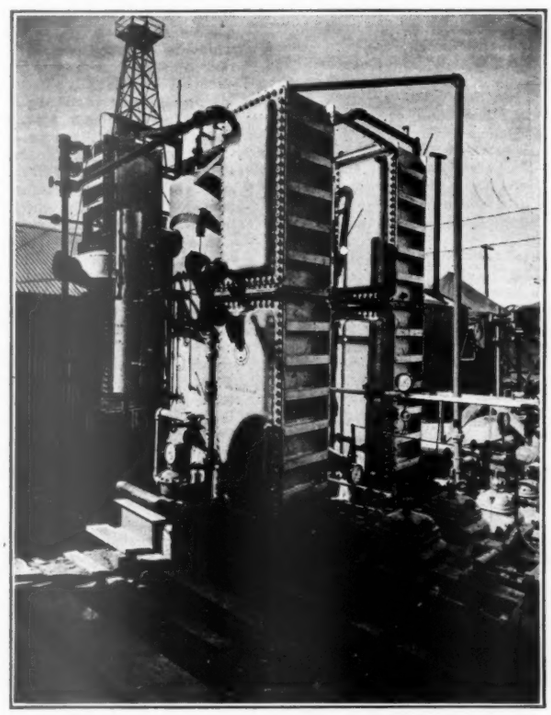

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SOUTHWEST TEXAS

(Continued from Page 52)

north of Flatonia, in the western part of the county, is assembling machinery.

Bexar County

Milham Corp.'s No. 1 Eastwood, a deep test in the Somerset Field, a little south and west of the town of Somerset, is now passing the "mile deep" point. It was 5,271 feet one day last week. It is still drilling in the lower cretaceous and has no interesting developments. The Milham Corp.'s No. 2 Eastwood has been abandoned at 1,710 feet at the bottom of the Austin chalk. It was an attempt to get the Austin to produce but without success. Utah Texas Oil Co. is drilling on the Ivan Vick in the southern part of the county, drilling continuing during the holidays, otherwise operations have been shut down in Bexar. Marland Oil Co., which started some months ago to core drill its block of several thousand acres in the eastern part of Bexar north of Adkins is still core drilling. It was expected a location would be made early this month. It is now thought the location will not be made for some time and additional core tests will be made.

Humble Oil & Refining Co. has moved its light gasoline driven rotary with which it was making formation tests on its block south of San Antonio to Maverick County where it will make a lot of tests on the D. Sullivan ranch in the southern part of the county. There are two D. Sullivan ranches in the county. The Humble has the south ranch. Rycade some time since leased the north ranch which is north of its Chittim ranch on which it is now drilling two wildcat tests. Rycade's No. 1 D. Sullivan is in Section No. 90, I. & G. N. Railroad survey, and is 2,640 feet to the north line and 1,300 feet to the east line. Rycade's No. 1 Chittim ranch test is having trouble with the casing at below 2,700 feet and its No. 2 Cox, a replacement well replacing No. 1, which was lost, is drilling at around 700 feet.

Tidal Oil Co. has closed a lease on 1,568 acres in Victoria County in the Bloomington, Crescent Valley and Dernal neighborhoods and covering seven farms.

John Sigmund will be unable to start his No. 7 Sigmund on the McCampbell ranch in San Patricio County for another month due to so much rain that it is impossible to get fuel to the location.

Frio Oil Co. is expecting to resume drilling in a few days in Frio County on its No. 1 Lyle-Sloan, which has been shut down during the holidays.

Roxana Petroleum Corp.'s No. 1 Hagerman in Guadalupe County south of Kingsbury has been abandoned at about 2,150 feet and 75 to 100 feet into the Edwards. It was a failure. It found the Edwards at about the same level as in the Luling Field a few miles to the northeast.

Mission Oil Co. in McMullen County is drilling at about 2,300 feet in No. 1 Washburn in the western part of the county. Sights and others on the Franklin ranch in the northern part of the county are about to resume at 800 feet after the holiday shut down and with a considerable showing of gas. Seagraves & Moody's No. 1 Aycock, which tested at 1,568 feet and got water, was unable to get the liner out and has pushed it to one side and is drilling again for deeper formations. The same company's No. 4 Jacobs, a few miles north and west of the Calliham Field, is drilling at about 400 feet.

Three Rivers Oil Co. is resuming operations on its lease in the Calliham shallow field and has started a new test on the Glass lease after several months' shut down. It is also taking a rig to the Mirando Field and will drill in the Edgington district.

Continental Oil Co.'s No. 1 Pryor in Zavala County is setting a string of 6⅝-inch. Cable tools are used and the 8¼-inch has been carried down to 2,600 feet. Below that the 6⅝-inch will be carried down until the Edwards lime is encountered. Byrd-Old Dominion's No. 1 Pryor in Zavala has been shut down for a few days at 1,700 feet due to two teeth being broken out of the rotary table.

Contract of the Crown Central Corp. for the purchase of crude in the Calliham Field expired the first of January and a new contract is being negotiated. In the meantime considerable crude has accumulated in storage. Only 6,000 bbls. were shipped out during December. W. J. Walton is arranging to start another wildcat test in the Three Rivers district.

Southern Gas Company

Southern Natural Gas Co. of San Antonio, Tex., has changed its name and has been refinanced. The new name is Southern Gas Co. The company built a gas pipe line a few years ago from McMullen County to San Antonio. It has the past year extended its line at a cost of $400,000 to southern Live Oak County and has its second extension of nearly 100 miles to Webb County nearly completed. Its original line was 70 miles long.

In the refinancing a new issue of $3,000,000 of gold bonds was issued bearing 6½ per cent and the old issue of $1,750,000 of bonds called in at $105 and accrued interest. The old issue of 50,000 shares of common stock of no par value has been increased to 70,000 shares. An issue of $2,000,000 of 7 per cent preferred stock is provided for in the new plan which is a new issue. This is to be held in the treasury to provide for any future expansions that may be necessary.

The bond issue of $3,000,000 was oversubscribed by $750,000. None of the stock has been offered the public. L. J. Snyder of Kansas City, Mo., who succeeded the Late M. M. Sweetman as president of the Southern Natural Gas Co., is president and treasurer of the Southern Gas Co.; H. D. Hull is vice president and general manager, and H. A. Pagenkoff is secretary.

All the ditch for the new extension to Webb County is dug, all the pipe strung and most of the pipe laid and tested. It is expected the line will be ready for operating within a week.

Gibson Completes Well

Gibson Oil Corp. and J. E. Walsh have completed No. 2 Viola Wilson in Medina County, 300 feet south of Eastham & Tarver's No. 1 Viola Wilson in the Ina Field and estimated to be good for a 100-bbl. well. Golden West Oil Co. is drilling in No. 1 Regina Schmidt, 300 feet north of Eastham & Tarver's well and has set casing in No. 2 Regina Schmidt which is 300 feet east of its No. 1 and the same distance north of the Gibson Viola Wilson No. 1. New tests are going in at once in Medina ounty. The Magnolia Petroleum Co. confirming its purchase of 320 acres from the Ina Oil Co, in the center of the field announced that it will start a drilling campaign as soon as possession is secured. It is expected the Magnolia entering the field means a pipe line in a short time.

Eastham & Tarver are erectiong the derrick for their No. 2 which is 300 feet west of their No. 1 and Gibson-Walsh are preparing to get a derrick up at once 300 feet east of their No. 2 and the same distance south of their No. 1. This makes a group of wells as a center from which the field is spreading. Golden West has another well on an 80-acre tract a half mile north and a producer there would force both The Texas Co. and Magnolia to start offset wells. The past week a water well being drilled on the August Gerdes farm 4 miles southwest of the Ina Field hit gas at 260 feet which made about 50,000 cubic feet per day. The gas caught fire and at last accounts was still burning. Another water well in the western part of Medina County on the Saathoff farm, 4 miles south of D'Hanis, ran into an oil showing at 400 feet. Neither well is important in itself but both are considered important as helping to find the structures.

DeWitt County

Cuero Oil & Gas Co. started to set casing in the No. 1 Holzappel in DeWitt County a few miles southeast of Cuero. Casing will be set at about 2,600 feet and below that 400 feet of liner. The well was plugged back from about 3,450 feet to make the test. Grayburg Oil Co. is

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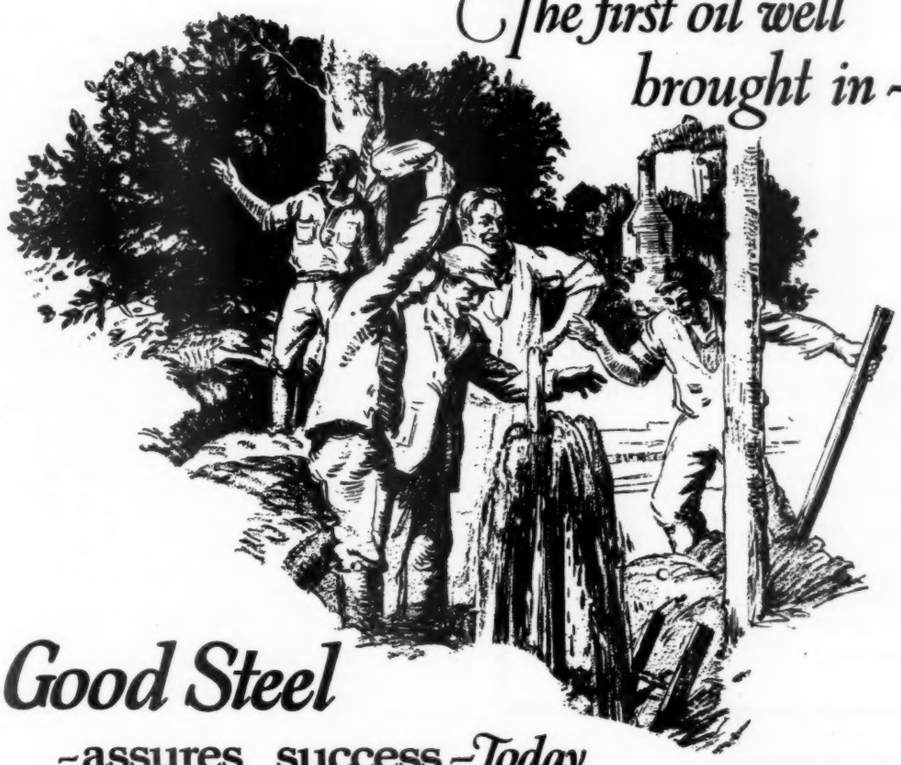

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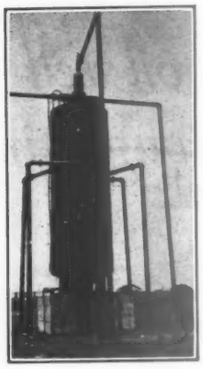

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understood to have taken an interest in the well which is being drilled by local Cuero people and Grayburg will supervise the setting of the casing and making the test. There is no proven production close and the well if it makes a producer will open a new area as well as a new field. The Yoro Development Co., 8 miles south of Yoakum, has its fourth showing of oil at 2,030 feet from the other showings being at 1,730, 1,840 and 1,950 feet.

Miscellaneous

Magnolia Petroleum Co.'s No. 1 Day, in eastern Guadalupe County, south of the town of Luling, is shut down at 3,447 feet waiting for fuel, the roads having been too muddy.

For about a week South Texas has had sunshiny weather and roads are rapidly drying up.

George B. Pickett's No. 1 West in Live Oak County of Three Rivers is drilling at 2,085 feet in very hard rock.

Utah Texas' No. 1 Ivan Vick, in the southern part of Bexar County, has had a showing of 20 feet of sand at 864 feet, the sand carrying oil and believed to be sufficient to make a commercial well.

CANADIAN FIELDS

(Continued from Page 52)

duction somewhat nearer the international boundary. The Canadian Oil & Refining Co.'s (Rogers-Imperial) gasser on Section 29-1-11w4, some miles due north of the Gladys-Belle-Brown test in the Sweetgrass Hills, is so far the most conspicuous discovery in this area, with a production variously estimated from 23,000,000 to 50,000,000 feet a day, open flow. At present there is no market for the gas, which is shut in; but there is talk of securing a market in Montana, though at present Provincial Government regulations prohibit export from Alberta.

Imperial Oil, Ltd.'s No. 2 Dead Horse Coulee, Section 32-1-11w4, about a mile north of the Rogers-Imperial, proved a failure last year, a showing of oil in a thin sand failing to develop commercial production. The test was not carried through the Madison lime. For the coming year, Imperial Oil, Ltd., will drill at Erickson Coulee, Section 8-1-12w4, some 8 miles west of No. 2 Dead Horse Coulee. This test is now rigged up. Close to Coutts, on the Quarantine Reserve area, Urban Oils, Ltd., is expected to finish its No. 1 Moodie, Section 4-1-15w4. This test claims some small oil and gas showings. Further drilling in the border field in 1926 will probably depend on results secured in these two tests.

It is reported that William Maughan of Lethbridge and George Muir of Calgary have closed a deal with "Brick" Shuler to drill out one of his leases in the Kevin-Sunburst Field. The acreage is about 2½ miles northeast of Kevin and has producing wells offsetting on three sides. Maughan and Muir are both interested in the Urban Oils, Ltd.'s test at Coutts, Alta.

According to latest reports, the Urban Oils, Ltd.'s, No. 1 Moodie, Section 4-1-15w4, is down 2,600 feet and pounding on a 26-foot piece of casing lost in the hole about four weeks ago. This work is practically finished, and casing will now be set to shut off the water before definitely testing the oil and gas showings encountered at this depth.

In Foothills Belt

In the foothills belt, outside the Turner Valley Field, the year 1926 will see three distinct areas definitely tested. In the Willow Creek Field, west of Nanton, the Imperial Oil, Ltd.'s Rice Creek test, now shut down below 4,025 feet, will be finished in the spring. West of Edmonton, the Imperial Oil, Ltd.'s No. 2 Coalspur is reported to have resumed drilling, after a difficult fishing job at 3,985 feet; and this test also should be completed early in 1926. It will likely drill through the winter. A new area in the foothill belt, is the Jumping Pound district, 25 miles west of Calgary, where Imperial Oil, Ltd., is now rigging up its No. 1 Bow River, Section 12-25-5w5. This is expected to develop a deep test, and may not give definite results before 1927.

Outside these areas, little activity is predicted. Tests may be drilled in the Lesser Slave area of northern Alberta, and the district of the Upper Peace River. In the Medicine Hat Field, definite results of No. 1 Roth, deep test, have not been reported. Northeast of Medicine Hat some further drilling is likely in the Many Island Lake Field, results so far secured having been encouraging, but not conclusive, with, so far, no commercial oil production.

No very extensive drilling for natural gas is anticipated in 1926; though the Northwestern Utilities, Ltd., of Edmonton and the Canadian Western Natural Gas Co. of Calgary will probably do a little drilling to protect their supply.

Whether or not Imperial Oil, Ltd., will do any further drilling in the Fort Norman area in 1926 has not been announced, but the limited nature of the proven field and the impracticability of making it a commercial producer under existing conditions will likely lead the company to concentrate its efforts on Alberta areas where marketing conditions are more favorable.

In the Ontario fields, relatively little drilling activity is foreshadowed for 1926. The large natural gas pipe line companies will, it is anticipated, do a little drilling, practically all in proven fields, to maintain their supply, if possible. Further development work is most likely in the new Courtland Field in Norfolk County.

The most important wildcat test now in sight is that of the Senator Michener Syndicate on the holdings of the Six Nations Indians near Brantford. North of Thamesville, there is a prospect that the E. P. Rowe deep test will be completed in 1926 by the Colchester Oil & Gas Co., and there may also be some shallow drilling in Zone and Camden Townships, Kent County, by allied interests.

GULF COAST

(Continued from Page 48)

of the Saratoga Pool, at 3,630 feet and quit. It is more than 1 mile from production. A derrick is up for No. 3 Teel. In the pool, the Paggi Oil Co.'s No. 8 Lewis is bailing at 1,245 feet.

In the Orange Pool, the Rycade Petroleum Corp.'s No. 14 State land, in Cow Bayou, came in early in the week, flowing 2,500 bbls. at 4,615 feet, but eased off toward the close of the week. The same company's No. 4 State land will pump at 4,600 feet.

South Louisiana

In the Lockport district, near Lake Charles, the Vacuum-Gulf company's joint No. 2 Farquhar was abandoned in salt water at 3,650 feet. Their No. 1 Friedberg & Wolf is bailing salt water at 4,650 feet.

The Vacuum-Gulf's No. 5 Miller is fishing around 4,400 feet and No. 6 Miller is being drilled around 855 feet. No. 2 Bordages is rigged to start drilling. The Marland Oil Co. of Texas' No. 1 Phoenix is drilling around 5,700 feet.

In the Jennings (Evangeline) Pool, the Jennings Oil Co. has started No. 1 Heywood; F. I. Getty is drilling No. 2 Clement, and the Gulf Refining Co. No. 9 Clement. The Texas Co. is working over old holes on the Latrielle.

In the Vinton Pool, the Gulf Refining Co.'s No. 48 G. N. G. is pumping 25 bbls. at 2,400 feet.

The Gulf company's No. 28 Star is drilling around 3,235 feet. The Texas Co.'s No. 1-A Gray is at 3,343 feet and No. 1-C Gray below 2,400 feet. The Vinton Petroleum Co.'s No. 5 Gray is drilling around 1,905 feet. No. 7 Vincent is working over and No. 17 Rescue is about ready to start drilling. Wilson & Broach's No. 4 Parks is rigging to work over. Marrs McLean is working over No. 9 Gray. The Edgerly Petroleum Co.'s No. 8 Vincent is deepening at 3,255 feet and No. 6 is preparing to work over.

In the Edgerly Pool, the Gulf Refining Co.'s No. 40 Bright-Penn is drilling around 1,000 feet.

In the West Columbia Pool, the Humble Oil & Refining Co.'s No. 1-B Wilson and No. 1 M. & W. are both going

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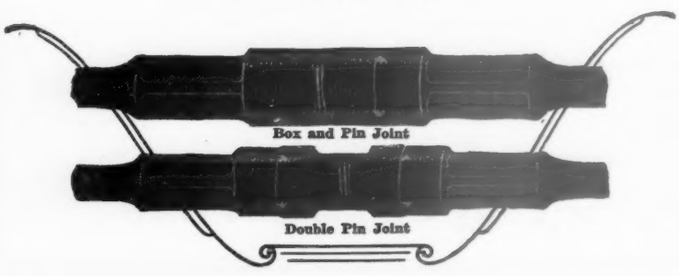

Box and Pin Joint

Double Pin Joint

on the jack as pumpers. The former is around 3,930 feet and the latter at 3,470 feet.

The Texas Co.'s No. 22 Arnold is drilling around 956 feet. The Gulf Production Co. started to work over No. 3 Underwood and the Hyde Production Co. has a derrick up for No. 1 Masterson on the northeast side, having taken over the lease from the Gulf Production Co.

Drilling Operations

In the Goose Creek Pool, the Gulf Production Co.'s No. 12 Galliard fee is working over, No. 10-A Wright is deepening at 2,745 feet and No. 2 Beaumont is rigging to drill deeper. No. 11 Chapman-Bryan is drilling around 3,985 feet. The Humble Oil & Refining Co.'s No. 12 Smith is pulling screen to drill deeper and No. 15 is rigging to work over. No. 66 is drilling around 2,035 feet. On Galliard Peninsula No. 23 is working over. No. 29 is washing at 2,900 feet and No. 30 is drilling below 4,365 feet. No. 1 Smith is deepening at 4,600 feet. The Sun Oil Co.'s No. 15-B Smith is at 655 feet. The Gulf Coast-Crown Central's joint No. 9 Galliard is working over.

In the South Lake Pool, the Lake Graham Oil Co.'s No. 19 Bashara is at 3,875 feet. The Yount-Lee Oil Co.'s No. 2 Gilbert is around 4,023 feet. The Primrose Oil Co.'s No. 1 Finkelstein is rigging to deepen.

At High Island, the Gulf Production Co.'s No. 1 Smith is drilling around 765 feet, and No. 4 Smith cemented casing at 3,300 feet. The Sun Oil Co.'s No. 6-C Cade set casing at 2,400 feet, No. 8 Cade is drilling below 3,500 feet. The Island Oil Co.'s No. 1 McCarthy is idle at 2,275 feet.

In the Batson Pool, the Ada Bell Oil Co.'s No. 104 Davis is bailing at 650 feet and the Peer Oil Co.'s No. 1 Christian is doing the same at 3,185 feet. The Navarro Oil Co. is rigging No. 1 Autry. The Kirby Pet-Capitol Oil Co. have a location made for No. 4 Hodges. S. R. Buchanan's No. 86 Milhome is drilling around 760 feet. The Sun Oil Co.'s No. 75 Hooksis at 3,415 feet. The Gulf Production Co.'s No. 164 Wing is drilling around 575 feet. The Acorn Oil Co.'s No. 58 Paraffin is drilling around 700 feet.

In the Hull Pool, the Gulf Production Co.'s No. 15 Baldwin is drilling at 2,795 feet and No. 21 Morris-Phillips is around 2,975 feet. On the Phoenix lease, No. 60 is below 3,600 feet. No. 61 is around 2,500 feet, No. 62 at 2,875 feet and No. 63 below 3,050 feet. The Republic Production-Houston Oil Co.'s Nos. 44, 59 and 68 Dolbear are working over. The Sun Oil Co.'s No. 8 Carr is at 2,385 feet. The Houston Production Co.'s No. 10 Barngrover is rigging. The Yount-Lee Oil Co.'s No. 13 Merchant is drilling at 2,875 feet. The Higgins Oil & Fuel Co.'s No. 5 Merchant is working over.

The Navarro Oil Co.'s No. 1 Cain at Pierce Junction is fishing at 1,540 feet. The Gulf Production Co.'s No. 15 Taylor is drilling around 2,575 feet. The Rio Bravo Oil Co.'s No. 2 Settegast is a derrick and No. 2 P. Settegast is drilling around 3,160 feet.

The Gulf Production Co.'s No. 13 Bassett Blakeley at Blue Ridge is drilling around 2,750 feet; No. 5 Luscher is rigging up. The Texas Co.'s No. 10 Robinson is rigging up to work over.

The Gulf Production Co.'s No. 26 T. W. Davis at Big Creek is drilling around 3,250 feet; No. 27 is rigging up.

The Yount-Lee Oil Co.'s No. 2 Gladys at Spindle Top is a derrick. No. 3 McFadden is drilling around 2,675 feet. The Hamm Brechin Drilling Co.'s No. 2 Gladys is drilling around 700 feet. The Lillian Oil Co.'s No. 2 Terrell is drilling around 947 feet. Flynn's No. 1 Gladys is drilling around 1,175 feet. The Baker Oil Co.'s No. 14 Trembly is drilling at 825 feet and the Gulf Production Co.'s No. 216 Gladys is rigging up to deepen.

Other Operations

At Orange, the Brownie Babbittee Oil Co.'s No. 3 McLean is drilling around 3,100 feet. The Continental Oil Co.'s No. 10 Chesson is drilling around 3,150 feet; No. 7 is straightening casing at 3,000 feet. The Edgerly Petroleum Co.'s No. 11 Carbello is rigging up to work over. The Humble Oil & Refining Co.'s No. 25 Chesson "B" is drilling around 4,025 feet; No. 26 is drilling around 2,325 feet; No. 1 Barber is washing at 4,630 feet. The Kishi Development Co.'s No. 7 McGuire is drilling around 4,775 feet. The Orange Petroleum Co.'s No. 1 Williams is drilling around 1,250 feet; No. 9 Chesson is drilling around 4,665 feet. The Rycade Oil Corp.'s No. 11 State land is a location; the Sun Oil Co.'s No. 1 Johnson and others is drilling around 4,980 feet; No. 3 Belile is drilling around 5,050 feet; No. 1 Caren is drilling around 2,425 feet. The Monarch's No. 1 Mecom is rigging up to work over. The Gulf Production Co.'s No. 1 Chesson "A" is drilling around 2,800 feet; No. 20 Lee Hager fee is drilling around 2,010 feet; No. 8 Kishi Lang "B" is drilling around 2,720 feet; No. 2 is rigging up. The Gulf Coast Oil Corp.'s No. 1 Leon is drilling around 3,400 feet.

More Completions

In the Hull Pool, the Humble Oil & Refining Co.'s No. 19 Guedry is flowing 2,400 bbls. at 3,185 feet. The oil tests 24 gravity and shows a temperature of 74 degrees, which indicates a very good producer.

Brane and associates are bailing No. 2 Hunt, a wildcat 6 miles north of the Goose Creek Pool in Harris County. Ten feet of screen was set at 1,600 feet.

Barncroft and others' No. 1 Haney, 3 miles east of Elena, is idle. Armstrong and others' No. 1, near the San Jacinto battlefield, is below 850 feet. The Texas Co.'s No. 4 Mack Miller is drilling below 3,800 feet. The same company's No. 6 Warren at Hockley Dome is around 1,800 feet.

In Liberty County, the Harrison Oil Co. is starting No. 1 Schlindler on the southwest side of the old Dayton Pool. The Humble Oil & Refining Co.'s No. 1 Welder across the river from the South Liberty Pool, is around 3,300 feet. Other tests in Liberty County are idle.

At Big Hill Dome in Jefferson County, the Houston Oil Co.'s No. 4 Sun-Davis is drilling below 3,200 feet and No. 1 Sun-Dyson is around 2,800 feet.

In Chambers County, W. C. Moore's No. 2 Blecke, northeast of Anahuac is idle at 800 feet. C. T. Rucker's No. 2 Fisher is shut down waiting on a boiler.

In Grimes County, Rassmussen and others' No. 1 Dodd, 4 miles west of Iola, is sidetracking from 3,480 feet. Part of the drill pipe is stuck in the old hole.

In Duval County, the Humble Oil & Refining Co.'s No. 4 Schallbert on the west side of the Palangana Dome, is around 1,645 feet and idle waiting on a heavier rig. The same company is drilling No. 1 Hasler.

The J. K. Smith Co. and Magnolia Petroleum Co. have taken acreage at Piedras Pintas Pool and made locations. The Humble Oil & Refining Co. is starting No. 5 Walsh, south and west from No. 4, a deep sand producer there.

Down in Starr County, O. W. Killiam's No. 1 Guerrara is drilling around 500 feet. The Texas Co. set casing at 1,330 feet in No. 2 Jennings ranch in Zapata County.

In the Rockdale-Minerva shallow sand section of Milam County, the Bowman Oil Co. is drilling No. 7 Gaither and the Milam Production Co.'s No. 4 Gaither.

Miscellaneous

Tank car shipments from the Laredo-Jim Hogg districts during the month of December total 763 cars. Of the total 663 cars went eastward to Aransas Pass, Texas City and Houston and 96 cars to Laredo and San Antonio refineries.

Total shipments for the year 1925 aggregated 12,281 tank cars.

MEXICAN FIELDS

(Continued from Page 48)

up another test in the Tanchicuin; and over in the Peralta its No. 3 is around 1,000 feet in shales.

Cacalilao

In the Cacalilao sector of the northern fields drilling operations are best re-

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flected as follows: La Corona Petroleum Co.'s No. 175, Lot 4, is in gray lime at 1,605 feet. International Petroleum Co.'s operations in Lot 5: No. 244 is in gray lime at 1,790 feet; No. 245 is in the same formation with the hole full of oil at 2,005 feet; No. 246 is in white lime at 2,220 feet; No. 252 is in gray lime at 1,800 feet; No. 253 is shut down on account of bad roads at 1,320 feet, and this also applies to No. 254 at 2,035 feet, both in the San Pelipe limes; No. 256 is in the same formation, shut down at 2,080 feet on account no fuel; No. 258 is in gray lime at 1,750 feet; No. 259 is shut down in the same formation at 1,960 feet; No. 260 is in the San Felipe at 1,380 feet, and No. 261 is testing cemented 8-inch at 1,200 feet. Mexican Sinclair Petroleum Corp.'s No. 89, Lot 3 Cacalilao, is ready to spud. Mexican Petroleum Co.'s No. 20, Lot 1 Cacalilao, is in gray lime at 2,165 feet. Transcontinental Petroleum Co.'s operations in Lot 4: No. 153 is in gray lime at 1,560 feet; No. 206 is in lime at 1,975 feet; No. 214 is in gray lime at 1,580 feet; No. 234 is shut down for fuel in lime at 2,300 feet, a deep hole. No. 236 is in gray lime at 1,610 feet; No. 237 is in gray lime at 1,405 feet, but is evidently expecting something as it is putting on an oil saver; No. 239 is in lime at 2,275 feet. In the Paciencia, just north of Cacalilao, Transcontinental's No. 47 is in lime at 2,140 feet; No. 55 is running 6-inch at 2,005 feet, lime, and No. 56 is running 10-inch in shale at 600 feet.

South Fields

In the south fields, Huasteca Petroleum Co. has no less than five tests (two in Cerro Azul and three in Tierra Blanca) that are getting close to where they should tell something. Taking Cerro Azul first: No. 30-A is in brown lime at 1,951 feet No. 68-A is in brown shale at 1,260 feet; No. 70 is in a sandy gray lime at 1,970 feet. In Tierra Blanca Huasteca's No. 48 is in gray shale and shells at 1,910 feet; No. 54 is in brown lime at 2,029 feet; No. 57 is in hard gray lime at 2,140 feet, and four more tests are getting ready to rig. Up in Chinampa, Huasteca's No. 15, Lot 158 Casiano, is in shale and gumbo at 1,926 feet. In La Laja, yet farther north, its No. 2 is in a sticky blue shale at 3,146 feet. Agwi Companies' No. 29 Laguna de Tamiahua, cemented 10-inch in a hard gray shale at 2,051 feet. Cortez Oil Corp.'s No. 6, Lot 148 Amatlan, is in shale at 1,565 feet. International Petroleum Co.'s No. 32 Toteco is bailing in gray lime at 1,892 feet, and south of the Tuxpam River its No. 7 Agua Nacida is in shale and shells at 4,258 feet. Mexican Gulf Oil Co.'s No. 55 Toteco is in a hard baked lime at 202 feet. Mexican Eagle Oil Co.'s No. 28 Cerro Veijo is in gray lime at 2,205 feet; and in the neighborhood of Furbero it has spudded in No. 3 Mecapepec. Penn Mex Fuel Co.'s No. 3 La Pita, south of the Tuxpam River, and well west of anything yet completed in that section, twisted off rotary drill stem and is fishing. The hole is in lime shells at 3,490 feet.

Northern Miscellany

In the northern fields, among the more miscellaneous pools, consider Ebano. There, Mexican Petroleum Co.'s operations follow: No. 41 Chapacao cemented 8-inch in gray lime at 1,280 feet; No. 44 is 1,662 feet in gray lime; Nos. 47 and 48 are in the same formation at 1,744 and 1,115 feet, respectively; No. 51 is in gray lime at 2,180 feet; No. 1 La Raya cemented 8-inch in hard gray lime at 1,315 feet; No. 11 La Pez is in gray lime at 2,270 feet; No. 65 La Dicha is in gray lime at 1,160 feet; No. 66 is in the same formation at 1,495 feet; Nos. 2 and 6 Midway are in gray lime at 1,620 and 1,390 feet, respectively, and No. 8 there is rigging.

In Los Esteros, American International Fuel Co.'s No. 21 is in hard shale at 1,828 feet; No. 24 is in gray and brown lime at 1,919 feet.

In Corcovado, La Corona Petroleum Co.'s No. 18, Lot 6, cemented 8-inch in the San Felipe at 1,140 feet; its No. 19 is in gumbo at 200 feet. Transcontinental Petroleum Co.'s No. 24, Lot 6, is in gray lime at 1,760 feet; its No. 26 is spudding.

In the Marland Field, Cia. Franco Espanola's No. 26 Limon cemented 8-inch in broken lime at 1,450 feet; No. 37 is preparing to resume from 2,000 feet, broken lime; No. 38 is drilling in the same formation at 1,733 feet; No. 39 is in lime shells at 1,565 feet; No. 40 is in gray lime with shale layers at 2,245 feet; No. 41 cemented 8-inch in gray lime at 1,448 feet; No. 42 is rigging.

In the Chapacao, although this part of it belongs rather to Corcovado, Mexican Gulf Oil Co.'s No. 24 cemented 8-inch in gray lime at 1,188 feet; No. 28 is in the same formation at 1,317 feet, and one test is rigging.

In the Topila, Mexican Fuel Co.'s No. 20 Santa Fe, is running 8-inch in gray lime at 1,600 feet.

In its Chapacao right of way, National Lines' No. 26 is testing cemented 8-inch at 1,225 feet; and its No. 29 is in gray lime at 1,565 feet.

KANSAS FIELDS

(Continued from Page 44)

have built the rig for No. 2 Eastman, NW cor. SW NW, Section 5-31-6. The Southwestern Petroleum Co. has the rig up for No. 10 Eastman, NE cor. SE NE, Section 6-31-6. Waite Phillips and others have spudded a well in the Rainbow Bend district, No. 11, CSL SE NW, Section 28-33-3. J. A. Hull Co. has spudded No. 14 Wallace, SE cor. NE SE, Section 24-32-4. Forrester and others have built the rig for No. 1 Reynolds, NW cor. NE, Section 4-33-7.

Lyon County

O. W. Gulp has a machine in for No. 1 Parker, NW cor. SW, Section 5-19-11. McMann and others have spudded No. 1, SW cor. SW, Section 16-20-10. Able and others have a rig up for No. 1 Richards, NW cor. NW, Section 7-21-10. Edwards & Buck have the rig up for No. 1 Rathkin, NE cor. NW, Section 14-21-10. Ritchie & Moore's No. 1, SE cor. SW, Section 34-21-10, is swabbing 1,000 bbls. from sand 2,161-94 feet after a shot of 40 quarts; and No. 5 Pixlee, SW cor. SE SW, Section 34-21-10, is rigging up. White Eagle Oil Co. has rigged up No. 1 Pixlee, SW cor. SE, Section 34-21-10, and the rig is built for No. 2 Pixlee, NW cor. SW SE, Section 34-21-10.

In the Madison district, the Phillips Petroleum Co. has built the rig for No. 2 Petroja, SE cor. NE SE, Section 32-21-12, and for No. 4 Lauck, NW cor. SW SW, Section 33-21-12, and the rig is on the ground for No. 5 Lauck, NW cor. NE SW, Section 33-21-12. and for No. 6 Lauck, SE cor. NW SW, Section 33-21-12.

Phillips Petroleum Co. has abandoned the rig for No. 1, NE cor. NW NE, Section 5-21-12.

Chautauqua County

Manning, Street and others have a dry hole in No. 1, NE cor. SE SE, Section 15-32-10, which is abandoned at 2,095 feet.

Elk County

Barber & Lemon have a duster in No. 1, CNW NE, Section 33-29-9, at 1,540 feet. Conley and others are rigging up No. 6 Tate, CEL NE SW, Section 3-30-9. Elk Petroleum Co. is drilling at 400 feet in No. 4 Denton, CWL NW SE, Section 3-30-9. W. A. Reed has a dry hole in No. 2, CNL SE SW, Section 3-30-9, which is abandoned at 2,305 feet. Anderson Brothers have completed a gas well in No. 1, CNE SE, Section 16-31-9. Sand was 1,441-53 feet and the well is shut in with 7,000,000 feet, a machine is being rigged up for No. 3 Logston, C SW SE, Section 16-31-9. Pure Oil Co.'s No. 8, CWL SW SE, Section 14-31-10, is good for 50 bbls. natural from sand 1,361-70 feet. Gillespie has a dry hole in No. 1, SE cor. NW, Section 27-31-10. It is being plugged from 1,443 feet. Theta Oil Co. has completed a well in No. 4, CSL NE NE NE, Section 27-31-10. Sand was 1,330-69 feet and the well is making 20 bbls. after a shot of 90 quarts.

Vickers Petroleum Co. has a dry hole

at 2,517 feet in No. 1, SW cor. NE, Section 1-24-3. Empire Gas & Fuel Co. has spudded No. 16 Wilson, C SE NW, Section 8-25-5; and No. 83 Hegberg, C NW, Section 28-25-5, and No. 14, C NE SW, Section 19-26-5, is swabbing 75 bbls. from sand 2,670-72 feet and is not completed.

Joe Nathan and others have spudded No. 1, SE cor. SE SE, Section 28-25-6. Phillips Petroleum Co.'s No. 1, NW cor. SE SW, Section 27-26-7, had sand 2,132-43 feet and is fishing for pipe. The well was shot with 40 quarts and had a showing of oil before the fishing job was encountered. White Eagle Oil Co.'s No. 1, SW cor. NE SW, Section 27-26-7, had sand 2,122-37 feet and the hole filled up 1,000 feet with oil in 5 hours. The well is not completed. Young Oil Co. has spudded No. 4, SE cor. SW NW, Section 27-26-7. Amerada Petroleum Corp. has built the rig for No. 3 Dingee, SW cor. NW SE, Section 22-27-7. Phillips Petroleum Co. has the rig up for No. 1 Richardson, SE cor. NE SW, Section 22-27-7. The Texas Co. has built the rig for No. 1 Truesdale, SE cor. SW, Section 22-27-7, and the rig is on the ground for No. 2 Truesdale, NE cor. SE SW, Section 22-27-7.

J. Connell has a rig up for No. 1 Pettit, NE cor. NE, Section 20-28-6. White Eagle Oil Co. and others have spudded No. 1, NW cor SE, Section 21-29-6.

Harvey County

S. A. Hunter and others have a dry hole in No. 1, SE cor. SE, Section 27-22-2, which is abandoned at a total depth of 930 feet.

Kingman County

Allison & Letz-Williams have built the rig for a wildcat test, No. 1, SE cor. NW NW, Section 25-27-7w.

Sumner County

Shawver and others have a dry hole in No. 1, SW cor. SW, Section 35-34-1w, which is being plugged from 3,871 feet.

NORTH LA.-ARKANSAS

(Continued from Page 56)

14 feet of sand at 2,538 feet in No. 3 Sandlin, Section 27-21-10.

Palmer Corp. is letting well flow at 4,626 feet, no change, in No. 1 Davis, Section 23-21-10.

Victor Wenzell is drilling in shale and boulders at 1,700 feet in No. 1 Lunsford, Section 10-19-9.

Arkansas Wildcats

Ashley County—Rhodes & Kirker are drilling in gumbo at 1,340 feet in No. 1 Bledsoe, Section 20-15-7, 16 miles outh of Monticello.

Calhoun County—Magnolia Petroleum Co. is coring at 3,480 feet in No. 1 Calion Lumber Co., Section 20-15-14, 6 miles north of Smackover production.

Clark County—Virgil Heath, trustee, is waiting orders at 838 feet after testing dry in No. 1 Arnold, Section 12-9-20, 4 miles northeast of Gurdon.

Cleveland County—Simms Oil Co. is drilling in lime at 3,203 feet in No. 1 Mosley, Section 19-10-11, 8 miles east of Fordyce.

Columbia County—Magnolia Petroleum Co. is drilling in gumbo at 1,650 feet in No. 6 Rhinehart, Section 36-15-20, and Russell & Kent are drilling in shale at 2,892 feet in No. 1 Emerson, Section 7-19-19, 10 miles north of Haynesville.

Hempstead County—Burton and others are drilling in rock at 1,162 feet in No. 1 Garland, Section 23-10-25, 4 miles north of Washington.

C. W. Robinson cored salt water and sand at 1,754 feet in No. 1 Toner, Section 29-12-23, and Tarver and others are drilling in rock at 2,783 feet in No. 1 Swafford, Section 14-11-25, 1 mile east of Washington.

Lafayette County—Arkansas Fuel Oil Co. set 6-inch at 2,758 feet in No. 2 Allen, Section 19-19-24, 1 mi'e east of Bradley, and set 6-inch at 2,749 feet in No. 1 Red River Land Co., Section 18-19-24, 1 mile north of Allen well. White and others are drilling in rock at 935 feet in No. 1 Roper, Section 27-16-23.

Little River County—Mellick Oil Co. is drilling at 1,480 feet in No. 1 Hawkins, Section 10-11-31.

Miller County—J. L. Bragden is arranging to deepen No. 1 Wiseman, at 2,555 feet, Section 36-15-27, formerly reported as No. 1 Wiseman, being drilled by Coplen and others. Humble Oil & Refining Co. is rigging up to drill No. 1 McKnight, Section 17-17-26, and No. 1 Miller L. & L. Co., Section 3-18-28.

Lenze and others set 10-inch at 85 feet in No. 1 Dale, Section 25-15-26.

Nevada County—Greason and others set 6-inch at 1,666 feet in No. 1 Grove, Section 2-14-21; Magnolia Petroleum Co. is drilling in red shale at 4,200 feet in No. 1 B. F. Johnson, Section 3-15-21, and Smitherman-McDonald set 10-inch at 43 feet, now down 500 feet, in their No. 1 C. W. Waters, Section 1-14-21.

CALIFORNIA FIELDS

(Continued from Page 50)

was boosted from 25 to 75 bbls. a day, while the output of the latter was increased from 100 bbls. to 148 bbls. a day. Several new rigs are going up on Los Angeles Investment Lease No. 1, but no appreciable increase is anticipated in the company's drilling report, as they will probably not be spudded in until work has been finished on some of the other holes now being put down.

The Shell is working on one new hole, No. 15 Rindge, and although considerable effort has been made to overcome water in No. 14 on the same lease, the production is still quite dirty. The California Petroleum also has a water problem on its hands in No. 6 Smith, which has been plugged back by stages from 3,890 feet to 3,778 feet. The Golden Flood Oil Co.'s output is still held up with a fishing job at 2,850 feet and it will probably be some time before the hole will be cleaned and put in shape again for a resumption of drilling.

Huntington Beach

The Standard sprung quite a surprise at Huntington Beach this week by bringing in two new wells, one of which proved to be the largest completion recorded in a long time. This was the company's No. 39 on Lease B, which came in flowing 720 bbls. of 21.2 gravity oil cutting 3 per cent, the hole being carried down ot 4,425 feet and finished with a 6¼-inch oil string. No. 37 on the same lease was only a small one, doing 100 bbls. of 20.8 gravity oil from 4,492 feet and, although the output is still rather dirty, it may perhaps clean up after the well has been on production for a few days. The Standard's Lease B, as recent developments have shown, looks better with each completion and will, no doubt, go a long way toward maintaining the company's present production of approximately 20,000 bbls. daily.

The Standard has three drillers, Nos. 40, 41 and 42, on this lease at present and, since a new rig has already been erected for No. 43, this hole may be spudded in shortly. A new derrick has also been erected for No. 24 Bolsa Chica and rotary equipment is being installed preliminary to an early spud. No. 1 Newland has just passed the 3,000-foot level and reports in the field tend to confirm the opinion of Standard geologists that the well should do better than 100 bbls. daily upon completion, as it is more favorably located than the tests drilled by the Union previous to the relinquishment of the lease. Several operators were after the property, but the Standard closed the deal with a cash bonus and a one-sixth royalty.

The California Petroleum returned No. 3 Craven Community at Torrance to production early in the week after cleaning it out and, although it is a comparatively small well, the production is fairly clean. The initial output upon being put on the beam was 60 bbls. of 16.4 gravity oil. The Chanslor-Canfield Midway Oil Co. is running four strings of tools in this area and will probably drill No. 40 Del Amo into production within the next few weeks and follow up this completion with another a short time later. The Shell is rigging up No. 7 Redondo, a new well, and since work has also been started on the derrick for No. 8, the company will probably spud in both within a short time. The General

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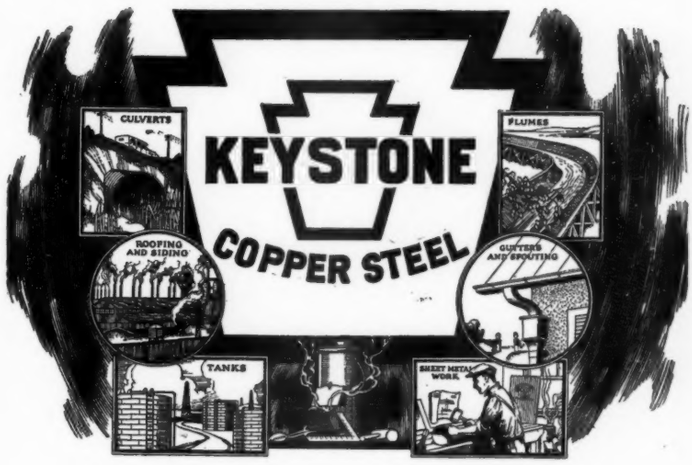

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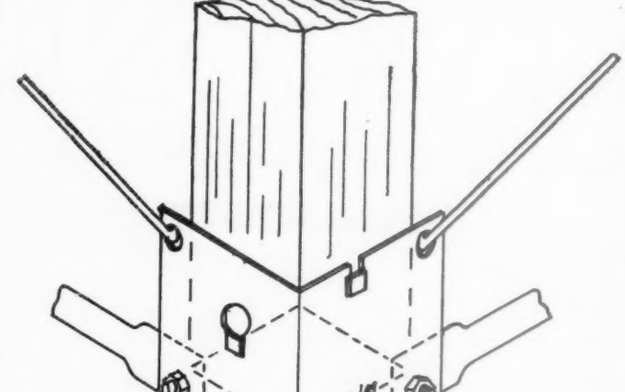

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Petroleum is making preparations to put No. 6 Carson on the beam at 3,400 feet, while the Superior is following a similar procedure with No. 7 Torrance, a workover at 3,797 feet.

Seal Beach

The Marland's Seal Beach wildcat, No. 1 Bixby, looked mighty good early this week when it made a short flow and, although it looked for a time as though a successful water shut off had been effected, this was not the case. The company is of the opinion, however, that a satisfactory shut off had been effected temporarily, but that the heavy gas pressure ruined the plug put in bottom and, with this idea in mind, another attempt will be made to replace the defective plug. The most promising thing in connection with the test made recently was the kick which the well displayed and it is safe to assume that a good flowing well will be brought in as soon as the present handicap has been eliminated.

The showing of this well will naturally encourage further work and Marland officials have every reason to be jubilant since the property north of this well looks very good. No actual gauge was made of the flow since it went directly to sump, but it is estimated at 200 bbls. of oil and about 1,000 bbls. of water. This is, by the way, a much better showing than either of the two pioneer wells drilled by the Shell have shown to date. The two latter, east of the Marland's holdings, are good for around 50 bbls. of oil each accompanied by about 1,000 bbls. of water.

The old Montebello Field is taking a new lease on life due to the decline in production at other points and, when better prices prevail for crude, additional work will undoubtedly get under way in this area. At the present time the McGinley Oil Co. has three drillers to its credit, the St. Helens two, Standard three and Superior Oil Co. one.

The Coyote Field will also respond to improved conditions and additional work can be anticipated in this area as soon as a determined effort is made to develop deep production, which has already been proven up. The Standard has a big reserve here which can be drilled up as occasion demands. The Birch-Royer well in this area is hung up with bottom water and, although this hole looked quite promising for a time, it is quite doubtful whether the penetration secured will be sufficient to result in commercial production. E. L. Blanton reports a hard sandy shale on the Gualdine property at 1,800 feet and it is quite possible that this hole will be carried down to the deep zone. Satisfactory progress was made in practically all of the drillers at Fullerton, although it will be several weeks before any of them come into production. The Union's two wildcats on its Olinda lease are still held up with mechanical trouble, but drilling should be resumed within the next few weeks.

Midway-Sunset

Unless all indications fail, two wells should test out the Obispo zone in the Maricopa flats sometime during the annual meeting of the American Petroleum Institute and it is quite possible that operators in attendance may be advised of the outcome before the session adjourns. At any rate, the California Petroleum and the Midland Oilfields should be in a position to determine the potentiality of this sand, as the former's Maricopa Star well is being prepared for production at 4,014 feet and the latter's No. 1 Blanck is scheduled for an early test at 4,090 feet. Both wells have logged an oil sand and if a water shut off is secured, the stage will be all set. The El Dora in Section 32-12-23, is temporarily hung up at 3,670 feet, but the management is confident that drilling will be resumed shortly and the bit carried down to the Obispo sand found around 4,000 feet. The Midway-Northern's Maricopa flats well in the same section was only spudded in a few weeks ago, but the bit is already down 2,800 feet and going ahead nicely. The Miocene Oil Co. has its No. 4 standing cemented at 3,625 feet, while the Obispo test of the Julian Petroleum is in a blue shale at 2,260 feet. The United Oil Co. finished its No. 1 Transport in Section 32-12-23 in the upper zone at 3,762 feet and it came in doing 200 bbls. a day.

In the Midway section of this field, the General Petroleum is preparing to bring in No. 1 Emme in Section 24-31-22 and the outlook is rather promising, so much so, in fact, that material is on ground for Nos. 2, 3 and 4. In Section 20-31-24 the Federal Drilling Co. put its No. 11 on a pumping test at 4,966 feet and it is making 186 bbls. of 23.1 gravity oil and considerable gas. The United's No. 1 Calidon in Section 20-31-23, being carried down for a deep test, is now at 4,560 feet with the outlook not any too encouraging. In the Hovey Hills area, No. 1 Gonyer of the Belridge Oil Co. cored a gray sand at 2,300 feet, which reacted favorably to the ether test and, although the well will not be productive at the present depth, it looks rather encouraging and production may yet be developed.

Ventura

The Associated's daily production in the Ventura Avenue Field was boosted 3,500 bbls. when No. 21 Lloyd blew in prematurely a few days ago from 5,850 feet. It came in barefooted and the heavy gas pressure literally blew the drill stem out of the hole and, although the well was running loose for a short time, it is now flowing into tanks under a pressure of 600 pounds. In addition to the oil production, the well is making approximately 2,000,000 feet of gas daily and, although there is in excess of 1,000 feet of open hole, the company will allow it to flow under present conditions until the gas pressure tapers off before making an effort to finish it. This well, which is the most easterly producer in the field, is located quite high up on the slope of the hills near the ridge. No. 20 Lloyd, now going ahead at 5,050 feet, will probably be the Associated's next completion in this area and indications point to a good well some time during the next two or three weeks. No. 101 on this lease, which blew out a few weeks ago, is held up with pipe trouble at 5,090 feet, but it is only of a minor nature and this hole, which is one of the most important in the field, should get under way again shortly. It is evident that the company expects production as a 4-inch gathering line is being laid from this well to the central storage tanks.

The Shell did not bring in any new producers during the week, but the company completed abandonment work on No. 8 Gosnell, lost because of mechanical trouble, and staked three new locations. Individually they are Nos. 19 and 21 on the Gosnell lease and No. 11 Taylor. The new derrick for No. 5 Edison is just about completed and spud will undoubtedly be made within the next two weeks. The company is making preparations to give No. 10 Taylor an early test and, although it is only at 4,960 feet, production is practically assured. The Bolsa Chica Oil Co. has just found its first upper show on the Hartman lease, but no test is contemplated as the present objective is the deep productive horizon. The Milham's No. 1 Sexton, east of the Associated's Lloyd lease, has all the appearances of being off structure, but the company is fully justified in drilling as there may be another uplift at this point.

The Shell is grading for a wildcat west of the Standard's holdings at Piru and it is quite likely that rig construction will get under way within the next week. Hoyt S. Gale seems to have a duster on the Beardsley property near Camarillo, as nothing of particular interest has been noted from the grass roots down to 4,900 feet. No. 1 Hobson of the Chanslor-Canfield Midway Oil Co., a wildcat being put down between the Ventura Avenue Field and the ocean front, is held up with pipe trouble at 3,220 feet.

Southern California Wildcats

None of the various wildcats in Southern California showed any improvement during the past week and there is not a really promising looking hole being put down at present. The Bandini Petroleum has stopped work on its test in the Bandini section at 4,140 feet and, although the suspension is supposed to be only of a temporary nature, it is

quite doubtful if any further work will be undertaken. In the El Segundo sector, No. 2 Pacific Southwest of the Pan American is rotating ahead in a sandy shale at 3,500 feet and, although the Rider Syndicate's well, a wildcat in this section, was only spudded in a few days ago, it is rapidly nearing the 1,000-foot level. The Winwell Oil Co., after a suspension of several months, has reentered its Hawthorne wildcat and will make a test some time during the next week. The bottom of this hole is at 5,583 feet and, although a minor showing has been reported, the outlook does not look any too promising.

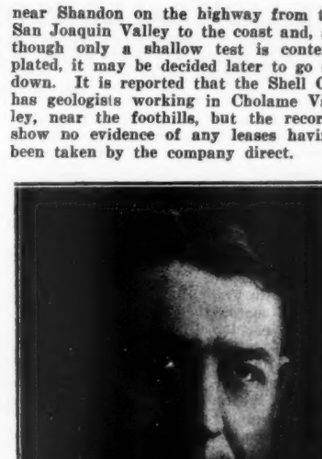
The Julian Petroleum has just about finished the rig for its Hermosa test to be drilled in Section 19-3-14, but drilling will not get under way for at least another two weeks, as the necessary preparations have not yet been completed. The Petroleum Securities has temporarily suspended work on No. 1 Narbonne, a wildcat in the Palos Verdes Hills, at 4,550 feet and it is understood that the company's geological staff has recommended an abandonment. It the Santa Ana Gardens region, the Standard is going ahead in No. 1 Playan at 3,589 feet and is cleaning out No. 1 Von Schriltz, drilled to 5,219 feet. The Anderson, Parsons & Kelly well near San Juan Capistrano has reached a depth of 1,890 feet and preparations are under way to land a surface string. No. 1 Von Schriltz of the Shell near Talbert has just passed the 4,100-foot level and, although the outlook at present is not very encouraging, the company still has a chance of developing production.

Northern California Wildcats

The Chanslor-Canfield Midway Oil Co. seems to have secured a satisfactory water shut off in its Delano wildcat and the hole will be cleaned out and put on the beam some time during the next week or 10 days. This test has shown some oil and gas, but it is quite doubtful whether commercial production will be secured. J. K. Porter sidetracked the liner in his test in the Poso Creek area, Section 32-26-28, and carried the hole down to 2,325 feet, at which depth the sand carries considerable water and some oil showings. The Main Oil Co. secured a satisfactory water shut off in its Wasco test at 4,150 feet and drilling is again being resumed. This is the company's second attempt to develop production in this area, the first hole, although it made considerable gas, being suspended several months ago. The Associated is testing out a few upper showings found in its Kerman wildcat in Section 35-13-26, but the outlook for production is not very promising. The Fresno-United Oil Co., operating in the vicinity of Raisin City, has suspended operations due to the lack of finances and it is quite doubtful if any further work will be undertaken.

The Bolsa Chica Oil Co. is making preparations to test out some showings of oil and gas found in its Kettleman Hills wildcat in Section 30-23-19 between 1,700 feet and 1,800 feet, but the odds are against production at this depth. The Standard's wildcat in Section 12-25-19, in the north end of the Kettleman Hills, is perhaps the most interesting well in this area. An unsuccessful production test was recently made at 4,048 feet and, since another slight showing has been reported at 4,550 feet, it may be well to watch this test for the next few weeks. The General Petroleum in Section 28-22-18 and the Marland in Section 12-22-17, are both held up with mechanical trouble. The latter is still working on its No. 1 Williams in Santa Barbara County, Section 32-9-32, and, although a production test was made at 2,645 feet, the formation at this depth was not productive and drilling will be resumed.

The Pyramid Oil Co. in Monterey County, Section 26-21-9, is still held up with mechanical trouble at 1,853 feet, but it is hoped that an early recovery will be made as this well looks unusually promising and stands a good chance of opening up an entirely new field. The acreage, however, is tied up solid and held in large blocks. The Portland Petroleum Corp. is erecting a rig on the Sacramento ranch in Section 31-27-15, near Shandon on the highway from the San Joaquin Valley to the coast and, although only a shallow test is contemplated, it may be decided later to go on down. It is reported that the Shell Co. has geologists working in Cholame Valley, near the foothills, but the records show no evidence of any leases having been taken by the company direct.



Frank F. Hill

A veteran in the service of the Union Oil Company of California, Mr. Hill is one of the most practical oil men on the Pacific Coast today. Starting as a teamster in the Ventura Field in 1895, he has been continuously associated with the development and production end of the industry. In 1902 he drilled the first well for the company in the Lompoc Field. He was promoted to general field superintendent in 1903 and retained this position until 1912. By this time the operations of the company had become extensive enough to warrant the appointment of Mr. Hill as superintendent of development. In 1917 the activities in the field were rearranged, Mr. Hill assuming the duties of superintendent of the southern division. Six years later, he was appointed to his present position as manager of field operations.

OKLAHOMA FIELDS

(Continued from Page 44)

and the Turkey Mountain sand 2,258-83 feet; Sand Springs Home's No. 4 Simons, CSL NW NE NW, Section 3-19-11, is rigging up. Nowata Oil & Refining Co.'s No. 3, C NE SE, Section 30-19-12, is dry and plugged at 2,223 feet.

Payne County

Magnolia Petroleum Co. has the timbers in for No. 1 "B" lease, NW cor. SE SW, Section 8-19-5.

Osage County

C. B. Peters and others have completed No. 3, SW cor. NE, Section 32-24-9. Sand was 1,490-1,597 feet and the well is making 30 bbls. after a shot of 60 quarts; No. 6, C N half NW, Section 32-24-9, is swabbing 60 bbls from sand 2,505-07 feet and is not completed. Devonian Oil Co. is rigging up a machine for No. 12, NE cor. NW, Section 34-25-11. In southern Osage the Finance Oil Co. and the Delmar Oil Co. have spudded No. 6, C N half SW, Section 18-22-11.

Skelly Oil Co. and others have a well in No. 6, NE cor. NW NE, Section 2-21-8. Sand was 2,355-80 feet and the well was shot with 20 quarts and is good for 60 bbls. Phillips Petroleum Co. has rigged up a machine for No. 7, CEL SE SE, Section 10-21-9. Moore and others have spudded No. 6, SW cor. SW, Section 11-21-9. Titus & Norris have rigged up a machine for No. 5, CWL SW, Section 15-21-12. Winona Oil Co. has a rig on the ground for No. 3, SE cor. NE, Section 29-20-12. Westland Oil Corp. has built the rig for No. 2, NE cor. SE, Section 29-20-12.

Creek County

Mann & Bartlett have abandoned the location for No. 2, CWL SW NE, Section 5-19-8. Gled Oil Co.'s No. 1, SW cor. SE NE, Section 13-19-8, is good for 35 bbls. from sand 2,360-98 feet; and No. 4, CEL NE SE, Section 14-19,8, is making 70 bbls. from sand 2,902-14 feet; No. 5 Lewis, CEL NE NE SE, Section 14-19-8, is rigging up.

Near Sapulpa, the Crown Central Oil Co. is spudded and shut down in No. 1-A Scott, NE cor. SE SW, Section 10-19-10. Billingslea and the Shaffer Oil & Refining Co.'s No. 1, NW cor. SW, Section 7-18-9, is drilling at 750 feet.

In western Creek County, the Waite Phillips Co.'s No. 4 Simmons, CSL NE NE NW, Section 26-17-8, is flowing from the Bartlesville sand. It was found 2,900-75 feet and the well is making 450 bbls. and is not completed. The Dutcher sand was drilled 3,202-11 feet and found dry. Waite Phillips Co.'s No. 1, NW cor. SE SE, Section 27-17-8, is drilling at 450 feet.

South of Bristow, the Margay Oil Co. is rigged up and shut down in No. 1 Yardy, SW cor. NE SE, Section 4-16-8. Magnolia Petroleum Co. has spudded No. 4, NE cor. NW SW, Section 5-16-8. Atlantic Oil Producing Co. has the timbers on the ground for No. 2 Fixico, SW cor. NE SE, Section 29-16-8; and has spudded No. 5, CWL NE SE, Section 14-17-8. D. B. Mason is drilling at 550 feet in No. 1 Bright, SE cor. SW NW, Section 36-17-9. Bu-Vi-Bar Petroleum Co. has a dry hole in No. 1-B, SE cor. NE SE, Section 23-17-10, which is abandoned at 2,476 feet. Pioneer Petroleum Co. is drilling at 850 feet in No. 1 Bucktrott, NW cor. SW NE, Section 24-17-10. H. F. Wilcox Oil & Gas Co.'s No. 1, SE cor. SE, Section 27-17-10, had sand 2,505-14 feet and is estimated at 50 bbls. It may be shot. C. H. Stoker and others have finished a light well in No. 3, CSL SE SW NW, Section 16-16-9. Sand was 2,645-75 feet with a total depth of 2,690 feet and the well made 20 bbls. after a shot of 35 quarts. Jackson & Wise have a rig on the ground for No. 4 Hendrickson, CWL SW NE NW, Section 21-16-9. Birk Hoffield has built a rig for No. 7 Edwards, CWL SW NW, Section 33-16-9. B. E. Kennady has spudded and shut down No. 2, NE cor. NW, Section 6-18-12; and has completed a Taneha sand well in No. 3, CWL NW NE NW, Section 6-18-12. Sand was 1,590-98 feet and the well was shot with 10 quarts and made 20 bbls. S. J. Smith's No. 1, NE cor. NW SW, Section 3-17-11, had the Red Fork sand 1,465-78 feet and is good for 40 bbls. after an 80-quart shot. M. P. Evans has a rig on the ground for No. 1 Jaconfah, SE cor. NW, Section 7-17-11.

In the Mounds district, the H. F. Wilcox Oil & Gas Co.'s No. 3, CNL NW SE SW, Section 1-16-11, had sand 2,642-47 feet and plugged back to 2,645 feet. It was shot with 5 quarts and is pumping 35 bbls. and making a little water. Chief Drilling Co. is rigging up No. 1 Barnett, SW cor. NW SE, Section 7-16-11. Riverland Oil Co. has the rig and tools in for No. 1 Simmons, NE cor. SW SW, Section 18-16-11. Sheridan Oil Co. has spudded No. 4, SW cor. NE NE, Section 28-16-12.

In the Bristow district, the H. F. Wilcox Oil & Gas Co. has spudded No. 9, NW cor. SW NE, Section 2-15-8. C. G. Tibbens has abandoned No. 1-A, SW cor. SE, Section 25-15-8, at 2,477 feet. Roxana Petroleum Corp.'s No. 3, SE cor. NW, Section 7-14-7, had sand 4,102-55 feet and made 10 bbls. after a shot of 40 quarts. Haskell Oil Co. has spudded No. 4, NE cor. SE NW, Section 12-14-8. Prairie Oil & Gas Co. has spudded No. 2 Stanford, CSL SE NE NW, Section 12-14-8.

In the Donnelly Pool, Hall & Donnelly's No. 1, SW cor. SW, Section 20-14-10, had sand 2,829-30 feet and is being rigged up to pump. It is estimated at 10 bbls. oil and 30 bbls. water.

Devonian Oil Co.'s No. 1, SE cor. NE, Section 14-19-8, is estimated at 75 bbls. from sand 2,867-73 feet and is not completed. Glidden Oil Co. and others have a rig up for No. 1-A Island, CEL SE SW, Section 15-19-10. Burton & Holmes have completed a well in No. 3 Timothy, CSL SW NE, Section 22-19-10. Sand was 1,949-81 feet and the well made 60 bbls. natural and 80 bbls. after a shot of 120 quarts.

Amerada Petroleum Corp. had a showing of oil in sand 1,005-33 feet in No. 1-A, NW cor. SW NE, Section 19-17-10. J. H. Wright has the rig and tools in for No. 5 Tah Kay Ney, NE cor. SE NW, Section 24-17-10. H. F. Wilcox Oil & Gas Co.'s No. 1, SE cor. SE, Section 27-17-10, is good for 50 bbls. from sand 2,505-14 feet.

Near Bristow, the Texas & Pacific Coal & Oil Co.'s No. 7, SW cor. NW, Section 17-16-9, has a hole full of oil in sand 2,652-72 feet.

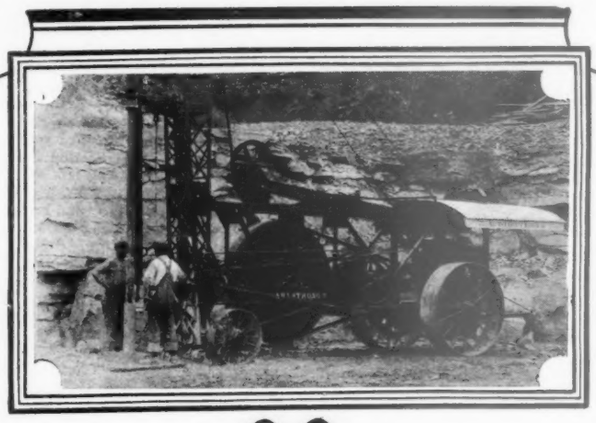
H. Terrel is rigging up a machine for No. 1 Imey, SE cor. SE, Section 4-18-11. The Texas Co. has a dry hole in No. 1, NW cor. NW, Section 28-15-9.

PETROLEUM SUPPLY AND DEMAND, PAST FOUR MONTHS

(Compiled by Charles E. Bowles from "Petroleum Statistics," issued monthly by the Bureau of Mines)

Supply	August	September	October	November
Domestic crude oil	66,887,000	64,768,000	64,352,000	61,658,000
Imports—all oil	5,332,646	4,903,464	5,314,873	5,807,461
Total supply	72,219,646	69,611,464	69,666,873	67,465,461
Demand—				
Domestic and export crude and refined	73,999,787	68,733,151	71,698,838	68,700,681
Difference	*1,780,141	878,313	*2,031,965	*1,235,220
Source of Difference—Increase in—				
1—Pipe line, tank farm stocks	1,804,000	2,808,000	2,526,000	1,428,000
2—Crude oil at refineries	*3,592,000	*55,000	*2,627,000	*889,000
3—Foreign crude not at refineries	*106,000	*71,000	*212,000	52,000
4—Refined products at refineries	113,859	*1,803,687	1,718,965	*1,826,220
Total change	*1,780,141	878,313	*2,031,965	*1,235,220
On a Daily Basis—				
The supply was	2,329,666	2,320,382	2,250,544	2,248,849
The demand was	2,387,090	2,291,105	2,312,865	2,290,023
Surplus or shortage	*57,424	29,277	*62,321	*41,175
Total Petroleum Stocks—				
(a) Pipe line and tank farm East of California	271,479,000	269,582,000	269,403,000	268,967,000
California light	41,300,000	42,759,000	43,773,000	44,426,000
(1) California heavy	75,659,000	78,905,000	80,596,000	81,807,000
(b) Crude at refineries east of California	30,715,000	30,660,000	28,033,000	27,144,000
(c) Foreign crude not at refs.	810,000	739,000	527,000	579,000
(d) Refined products at refineries:				
Gasoline (barrels)	36,683,714	36,051,190	36,410,667	37,854,286
(2) Other products	89,902,801	88,731,638	86,653,196	83,383,357
Total Stocks	546,549,515	547,427,828	545,395,863	544,160,643

(1) Includes fuel oil in storage in California.
(2) Does not include fuel oil in storage in California.
Please note—Decreases are shown by both * and **blackface** type. Increases are in light face type.



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BILLION GALLONS OF MOTOR FUEL A MONTH PRODUCTION FOR 1926

By Charles E. Bowles

For three months in 1925—June, July and August—we made approximately 1,000,000,000 gallons of motor fuel a month.

During the last four months of 1925 we averaged well over 900,000,000 gallons a month. Early in 1926 we will again hit the "1,000,000,000-gallons-a-month" pace—and, unless it is in the early months of 1927, we will probably never gain drop below 1,000,000,000 gallons of motor fuel in any month.

Few people, either without or within the oil industry, realize the amazing growth in our output of motor fuel in the last five years—and especially in the last two years.

In January and February, 1924, we were in the "600,000,000-gallons-a-month" class. During the other 10 months we were in the 700,000,000-gallons-a-month class.

In January, 1925, we pushed up into the 800,000,000-gallons-a-month class—but dropped back to 700,000,000 gallons in February. In March and April we got back into the 800,000,000-gallon class.

And then came the real spurt. In May, and in the remaining months of 1925, we made well over 900,000,000 gallons every month. And if we add to refinery gasoline the natural gasoinle sold as a finished motor fuel, and also include the small output of benzol, the total runs over 1,000,000,000 gallons of motor fuel a month for June, July and August.

Twenty Per Cent Over 1924

During the first 11 months of 1925 we made over 9,914,000,000 gallons of refinery gasoline. On this basis the output for the year will be in the neighborhood of 10,800,000,000 gallons. This is an increase of over 20 per cent over 1924.

And if this increase is maintained in 1926 it will mean that we will make over 13,000,000,000 gallons of motor fuel in the present year—or an average of well over 1,000,000,000 gallons a month.

The amazing thing is that we increased our output of refinery gasoline from about 750,000,000 gallons a month during the mid-summer of 1924 to close to 1,000,000,000 gallons a month during the mid-summer of 1925.

Based on estimates of both the Bureau of Mines and of The Oil and Gas Journal we have today an "unused" refining capacity of something like 800,000 bbls. a day. On paper, at least, this unused refining capacity looks to be potentially dangerous. And yet, by referring to the operating statistics of practically every other manufacturing industry we find that similar relations exist between the "rated capacities" of the plants and the rate of their actual operation. The real

(Continued on Page 214)

TABLE 1—Gasoline for the First 11 Months of 1924 and 1925—With Crude Run to Stills, Production, Shipments and Stocks, by Areas

Area—	Crude Oil to Stills Barrels	Gaso. Recov. Pct.	*Production Gallons	†Shipments Gallons	Stock Jan. 1	Stock Nov. 30
Kansas-Oklahoma:						
1924	71,825,187	45.3	1,367,149,389	1,399,264,479	138,199,798	106,084,708
1925	89,852,730	48.9	1,849,833,692	1,873,486,793	121,042,101	97,389,000
Texas, N. and C.:						
1924	28,004,904	34.7	408,669,697	403,832,836	9,927,536	14,764,397
1925	32,966,260	37.5	518,305,573	511,789,391	18,021,818	24,538,000
Ark.-N. Louisiana:						
1924	11,540,095	19.4	94,098,986	91,980,473	2,552,788	4,671,301
1925	14,779,038	19.2	119,147,302	119,872,436	4,907,134	4,182,000
Texas, Gulf Coast:						
1924	84,832,007	32.4	1,152,803,239	1,148,266,751	137,471,933	142,008,421
1925	98,635,103	36.5	1,512,389,745	1,478,072,882	136,393,137	170,710,000
La., Gulf Coast:						
1924	33,618,337	26.7	381,626,705	399,285,890	107,039,647	89,380,362
1925	46,516,361	23.3	455,506,727	334,782,047	81,068,320	201,793,000
Total Southwest:						
1924	**229,820,330**	**35.7**	**3,404,348,016**	**3,442,630,529**	**395,191,702**	**356,909,189**
1925	**282,749,492**	**37.5**	**4,455,183,039**	**4,318,003,549**	**361,432,510**	**498,612,000**
‡California:						
1924	135,580,670	21.7	1,236,236,880	1,127,510,220	191,780,375	300,507,000
1925	167,250,885	22.3	1,567,974,522	1,586,751,706	431,398,184	412,621,000
Rocky Mountain:						
1924	24,891,753	57.3	598,341,903	595,831,571	103,587,914	106,098,246
1925	23,948,102	55.9	562,114,238	519,436,707	115,836,469	158,514,000
East of Mississippi:						
1924	195,545,905	35.6	2,925,140,226	2,939,825,699	384,339,659	369,654,186
1925	203,708,275	38.9	3,329,306,908	3,199,432,462	390,258,554	520,133,000
Total United States:						
1924	**585,838,858**	**33.2**	**8,164,067,025**	**8,105,798,019**	**1,074,899,650**	**1,133,168,656**
1925	**677,656,754**	**34.8**	**9,914,578,707**	**9,623,624,424**	**1,298,925,717**	**1,589,880,000**

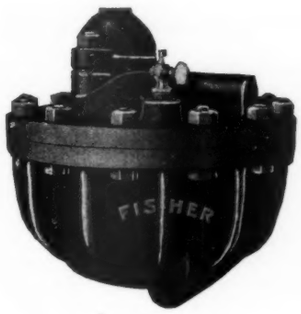
*Domestic production only—does not include imports.
†Domestic demand plus exports minus imports for Atlantic Coast, Gulf Coast and California, which are affected by imports and exports of gasoline. Inland areas are not affected by imports and exports.
‡Stock for November 30, 1924, is not the revised figure—119,422,532 gallons were added to the old figure at the end of 1924, thereby increasing the stock from 311,975,652 gallons to 431,398,184 gallons. This addition to California gasoline stocks made a similar change in the December 31, 1924, total for the United States. The effect of this addition is clearly seen by comparing the November 30, 1924, and January 1, 1925, stocks for both California and the United States.

TABLE 2—Fuel Oil for the First 11 Months of 1924 and 1925—With Crude Run to Stills, Production, Shipments and Stocks, by Areas

Area—	Crude Oil to Stills Barrels	Fuel Oil Recov. Pct.	*Production Gallons	†Shipments Gallons	Stock Jan. 1	Stock Nov. 30
Kansas-Oklahoma:						
1924	71,825,187	40.0	1,214,224,342	1,151,863,212	81,218,931	143,580,061
1925	89,852,730	38.2	1,441,979,204	1,386,577,844	132,450,640	187,852,000
Texas, N. and C.:						
1924	28,004,704	48.4	569,576,621	538,215,512	33,099,745	64,460,854
1925	32,966,260	48.6	673,523,972	682,818,361	62,984,389	53,690,000
Ark.-N. Louisiana:						
1924	11,540,095	68.6	331,593,857	332,192,811	5,424,678	4,825,724
1925	14,779,038	69.3	430,058,513	408,566,683	15,722,170	37,214,000
Texas, Gulf Coast:						
1924	84,832,007	45.9	1,637,018,045	1,739,059,211	317,230,204	215,189,038
1925	98,635,103	44.9	1,860,136,908	1,789,620,245	215,142,337	285,659,000
La., Gulf Coast:						
1924	33,618,337	38.7	547,196,890	488,029,658	51,042,996	110,210,228
1925	46,516,361	51.4	1,006,139,673	963,367,047	111,973,474	163,746,000
Total Southwest:						
1924	**229,820,330**	**44.5**	**4,299,609,755**	**4,249,360,404**	**488,016,554**	**538,265,905**
1925	**282,749,492**	**45.5**	**5,410,838,170**	**5,220,950,180**	**538,273,010**	**728,161,000**
Rocky Mountain:						
1924	24,891,753	46.8	490,057,955	494,870,430	28,743,036	23,930,561
1925	23,948,102	43.4	433,063,891	385,003,418	21,093,527	69,154,000
East of Mississippi:						
1924	195,545,905	42.3	3,476,508,921	3,549,410,602	345,092,140	272,190,459
1926	203,708,275	37.7	3,225,726,894	3,039,862,161	262,002,267	347,866,000
Total East of Cal.:						
1924	450,258,188	43.7	8,266,176,631	8,293,641,436	861,851,730	834,386,925
1925	510,405,869	42.3	9,069,627,955	8,645,815,759	821,368,804	1,145,181,000
‡California:						
1924	135,580,670	70.1	3,994,698,979	3,841,178,916	653,182,981	806,703,044
1925	167,250,885	70.0	4,911,398,614	x.....	x.....	x.....
Total United States:						
1924	**585,838,858**	**49.8**	**12,260,875,610**	**12,134,820,352**	**1,515,034,711**	**1,641,089,969**
1925	**677,656,754**	**49.1**	**13,981,026,569**	**x.....**	**x.....**	**x.....**

*Domestic production only—does not include imports.
†Domestic demand plus exports minus exports for Atlantic Coast, Gulf Coast and California which are affected by imports and exports. Inland areas are not affected by imports and exports.
‡Figures for 1924 are from "Petroleum Refining Statistics for 1924," issued by the Bureau of Mines.
xFigures not yet available.

Fisher steam traps reduce operation cost



When condensate is not properly drained from steam coils, pipe lines, or other apparatus water will collect and circulation is retarded. This decreases the efficiency of the system and raises the cost of operation.

Fisher steam traps are made to remove this condensation.

It has always been the policy of Fisher to put the best of workmanship in their products, so that mechanical construction is perfect, insuring proper operation.

Fisher traps are strong, simple and positive acting. A main feature being they have only two parts susceptible to wear, the valve and the seat. These can be changed without dismantling trap or disturbing pipe connections.

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A gas cooler that saves space—labor—operating cost

The G-R Vaneflo Gas Cooler

can be operated as an inter-, after-, or pre-cooler for casinghead gas and is especially adapted to absorption and compression type natural gasoline plants.

This cooler saves space because its counter-current flow of gas and water, high rate of heat transfer, and the twin design in which it can be furnished result in the most compact construction on the market.

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Address.....
The Griscom-Russell Co., Dept. J, 285 Madison Ave., New York
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35 CENTS a line first insertion; 25c a line each additional insertion. Cash in advance.

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MAIL your advertisement now. It will be published next week. Cash with order.

LEASES—PRODUCTION

TEXAS PANHANDLE RANCH for sale in fee, near oil and gas wells, cheaper than leases. Brokers don't answer. John P. Marrs, Wichita Falls, Tex.

OIL AND GAS LEASES

Marathon Fold—West Texas

30,000 acres Crockett County, large and small blocks; adjoining big companies; scattered wildcat. Also close-in adjoining World well block.

20,000 acres 10-year leases; low rentals; Terrell County, getting good play. Watch this county! Prices right.

Upton County. Scattered tracts.

60,000 acres one block, southeast Pecos County, on geological formation. Most attractive as to desirability, price and terms.

5,000 acres Irion County. Ten-year lease; watch the new work here.

7,000 acres Loving County. Ten-year lease; 10-cent rental. Right in line.

Write for prices and maps. Will allow time for geological inspection.

C. W. WEBSTER
W. T. Waggoner Bldg. Ft Worth, Tex.
Reference: Mercantile Agencies.

THE ORGANIZATIONS that get the bulk of the oil industry orders are those who are known to the industry and who can combine quality with speedy service. If you had your equipment listed in this section it would receive the same consideration that thousands are giving the good equipment advertised here.

FOR SALE
WESTERN TEXAS LANDS
By Owner
Save Commissions

25,000-acre mountain ranch in north Culberson County, well improved, well watered, good grass and in a real deer country. Price, $5 per acre.

50,000 acres in Hudspeth County; good improvements, good watering places and fine grass. Price, $4.50 per acre. No oil and gas leases on above ranches.

40,000 acres, Winkler County, as good a sand hill ranch as one can find. Under 10-year lease to Gulf Production Co. Price, $5 per acre.

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Wire or write
JOHN H. EDWARDS
Odessa, Texas

LEASE offering extraordinary. Test wells and Tortion balance now operating in search for oil on my two blocks, leases both sides Colorado River near Wharton, Wharton County, Texas. Geologists reports favorable, major companies have bought protection leases. Limited number leases for sale in midst operations. For particulars write, wire or phone, James W. Rich, Oil Operator, 401-2 Bankers Mtg. Building, Houston, Tex.

FOR SALE — 800 acres prospective drilling land, center of the big Uintah Basin of Utah and Colorado, which geologists say is the greatest undeveloped oil field in the world. Near oil field surrounded by enormous gas wells. Price of land rapidly advancing. Will sell in body or parcels 40 acres up. Near railroad. Terms. Need funds to develop adjoining land.

EMPIRE LAND SYNDICATE
503 Brisbane Bldg.
Buffalo, N. Y.

DUVAL COUNTY, TEXAS

6,760 acres for lease. Want one-eighth oil and gas bonus on escarpment. Two deep tests now 3,000 ft. drilling nearby. Next big strike. Write or wire, John D. Lamb, Payne, Ohio.

The Annual Review

will be published in February. It will contain a complete and accurate survey of the activities during 1925—a vast wealth of expert information presented in such form that detailed facts, figures and conditions will be easily available to the reader.

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The OIL and GAS JOURNAL
Tulsa, Oklahoma

LEASES—PRODUCTION

37,000 ACRES, now drilling for oil on 10,000 acres, located in active developments; only $6.50 in fee; worth more for lease; many other bargains in Southwest Texas. Ed Willmann, 203 Gunter Bldg., San Antonio, Tex.

HAVE BUYERS for flush or settled production in Oklahoma and North Texas. Vern R. Hartman, P. O. Box 442, Dallas, Texas.

NEW MEXICO

10,000-acre five-year oil and gas lease, checkerboarded in trend of development, 16 cents rental due State February 20, forced to sell part at low price to protect balance. 200 acres or more at 25 cents per acre. Act quick.

T. E. BALDWIN
City National Bank Building
Wichita Falls, Tex.

FOR SALE—Oil leases and royalties. Write us. Kevin-Sunburst Holding Corp., Box 348, Shelby, Mont.

LEASES FOR SALE or drilling. Webb, Zapata, Jim Hogg Counties. For further information write Olof Johnson, 608 Tower Avenue, Superior, Wis.

FOR PANHANDLE oil leases and drilling contracts, write Dr. W. R. German, Canadian, Tex.

FOR SALE—Oil and gas leases, settled production and leases partly developed. W. P. Harley, Bowling Green, Ky.

WE SPECIALIZE in oil leases in Culberson County, Texas. Have desirable acreage in the Permian formation on structure.

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Tri-State Leasing Co.
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OIL AND GAS LEASES

Running 10 years in Townships 22, 23, 24, Ranges 6, 7, 8, Garfield County, for sale at $1 to $2.50 per acre. Also other leases and royalties in Garber Field. A. B. Hugo, Enid, Okla.

A FEW 80 or 40-acre tracts close to our Wilcox test, just starting, to trade for pipe, tools or National machine. Box 489, Blackwell, Okla.

HAVE 12,000 acres oil and gas lease, with good geologist's report, for drilling contract. Inquire Chamber Commerce. Chas. A. Wright, Wright Bldg., Albuquerque, N. Mex.

LEASES—PRODUCTION

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	1 Time	2 Times	3 Times	1 Mo.
3 lines	1.05	1.80	2.55	3.30
4 lines	1.40	2.40	3.40	4.40
5 lines	1.75	3.00	4.25	5.50
6 lines	2.10	3.60	5.10	6.60
7 lines	2.45	4.20	5.95	7.70
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9 lines	3.15	5.40	7.65	9.90
10 lines	3.50	6.00	8.50	11.00

Compute white space at the above rates
Mail your advertisement to

THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

WEST TEXAS Marathon Fold oil leases. Personal investments since 1919. Write for data and maps. Paul Kons, P. O. Box 291, Fort Worth. Tex.

THIRTY-FIVE HUNDRED acres leased in good block in producing trend, Grady County, Oklahoma. Will give 85 per cent this acreage for well. Also have many good leases and royalties in high grade fields priced right. Write Midcenter Development Co., First National Bldg., Chickasha, Okla.

1,000 ACRES for an offset well. Free loan of casing. Virgin territory, 3 miles from production. About 1,100-foot drilling costing $2 per foot. Located in Warren County, Kentucky, northwest of Davenport Pool. Full information furnished responsible operators or companies. R. E. Cope, Box 489, Bowling Green, Ky.

FEE OWNER will lease SE SE NW, Section 7-4n-5w, Grady County, SE SW NE, Section 32-2s-2w, Carter County, Box 1, Oklahoma City, Okla.

WEST TEXAS oil leases along the Marathon Fold, in line with development. Also royalties. Cheap wildcat acreage, also protective acreage near the many drilling wells. Information furnished with prices. R. L. Cook, Box 812, Big Spring, Tex.

DUVAL COUNTY

26,000 acres near proven oil. Sell fee $8.50. Also 45,000 acres Webb County, $5.50 fee. Oil lease worth more on these tracts. Many other bargains. Ed Willmann, 203 Gunter Bldg., San Antonio, Tex.

LEASES—PRODUCTION

$120 BUYS ONE-FORTIETH INTEREST

in forty, forty-acre tracts well checkerboarded in Union County, New Mexico, in trend of early development by some of the major companies. This is with all rentals paid for life of lease. For full particulars address

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LEASES — Cumberland County, adjacent to Gushers brought in four months ago and still flowing. Attractive terms to parties who will develop. Write for particulars. Box 402, Glasgow, Ky.

MUST SELL good shallow production property, fully equipped, 290 acres. Eight steady producing wells in good condition, eight years old, making about 35 barrels daily, could be increased. Plenty sand. Many proven locations. Price $15,000.00 net. Bargain. Box B-100, The Oil and Gas Journal, Tulsa, Okla.

SOUTHEAST NEW MEXICO

Can furnish practically proven leases in Artesia Field, Eddy County. Also other tracts in Eddy, Chaves and Lea Counties. Particulars on request.

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HAVE SEVERAL pieces of flush and settled production for sale in Oklahoma and Wichita Falls districts. Prices reasonable and terms can be arranged if necessary. P. O. Box 1144, Dallas, Tex.

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KAY COUNTY ROYALTY CO.
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Dealers in northern
Oklahoma royalties.
Write us regarding your wants.

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REFINERY FOR SALE
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POSITION WANTED

WANTED POSITION with new organized or expanding oil company by woman, experienced in land and lease record work. Competent to handle such department. Satisfactory references. Box B-104, The Oil and Gas Journal, Tulsa, Okla.

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WANTED—Position as understudy to production manager with view of being given a district later. Domestic or foreign. Age 35, married. Have some experience in production methods. Am qualified geologist and been in executive positions last six years. P. O. Box 583. Long Beach, Calif.

GRADUATE ENGINEER with thorough practical oil experience open for efficiency or construction, gasoline plants, oil refineries. Now employed. Box B-110, The Oil and Gas Journal. Tulsa, Okla.

ENGINEER—Twenty-three years varied and active service as manufacturing chemist, superintendent and manager. Now open. Age 39. Box B-111, The Oil and Gas Journal. Tulsa, Okla.

REFINERY ENGINEERING draftsman, college graduate, age 30, married, 7 years' engineering experience, 3 years in refinery design, construction and maintenance. Desires position with progressive Mid-Continent refinery. Box B-108, The Oil and Gas Journal. Tulsa. Okla.

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WANTED—Drilling block with good geology, located in territory where large companies are interested. Must be first-class. Immediate action. We mean business. Box B-109, The Oil and Gas Journal, Tulsa, Okla.

ATTENTION
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The OIL and GAS JOURNAL
TULSA, OKLA.

POSITION WANTED

WANTED—Connection with oil company in Texas as lease scout. Have been running tools and leasing land for 10 years. Age 37. Box B-88, The Oil and Gas Journal. Tulsa, Okla.

WANTED—A man who has thorough knowledge of abstracting real estate titles and in platting land tracts, desires connection with oil company. Box B-107, The Oil and Gas Journal, Tulsa, Okla.

HELP WANTED

WANTED—Young, competent and experienced geologist. Must be ambitious and willing to work long hours. Will pay salary and expenses and carry for an interest in all work done by you. Answer, All American Petroleum Co., 1611 F. & M. Bank Bldg., Fort Worth, Tex.

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EXECUTIVE, ENGINEERS, $3,000-$25,000, find our individual, confidential service effective in making new connections. Personally conducted by Mr. Jacob Penn, the eminent employment authority, known to leading business men throughout America. Not employment agency. Jacob Penn, Incorporated, 305 Broadway, New York City, N. Y.

WANTED

WANTED—Acreage. Large blocks for drilling propositions. Send full details first letter to F. C. Purdy, Sterling, Kans.

WANT CONSIDERABLE structure acreage in Texas and Oklahoma for drilling, near production; no bonus, and only highest type geologic report considered. Give details. Box B-95, The Oil and Gas Journal. Tulsa, Okla.

WANTED—Producing ropalties Oklahoma and Kansas. Give full details. P. O. Box 502, Independence, Kans.

WANTED DRILLING
PROPOSITIONS
Will drill test well on well located acreage with good geology. Submit with full particulars to Steiner Oil Co., 347 Harvey Snider Bldg., Wichita Falls, Tex.

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During the year thousands of men use the classified Wants section to good advantage.
They use it to buy or sell leases, royalties, production, equipment or service of all kinds.
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Any size farm or ranch, cheapest good land in Texas. B. W. Floyd, office over First National Bank, Midland, Tex.

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Sell stock in your company quickly and economically. Worthy enterprises only.
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Inquire of us before you buy; write us what you have to sell; we will make you money and save you time and trouble.
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FOR SALE—Manufacturing business. To get real value we ask you to make investigations of L. E. P. preparations. F. C. Purdy, Sterling, Kans.

WILL SELL TEXAS RANCH
CARRYING MINERALS
5,000 acres. Spring water supply will control large area. Good investment for one who can hold for sure developments. Must raise $12,000. Good title. P. O. Box 725. Dallas, Tex.

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Two large tracts, one of 14,000 and one of 21,000 acres located in Colorado and Utah. Both tracts contain the rich mahogany shale and located on water. All assessments work completed, and land ready for patent. Will be sold at reasonable prices with patent guaranteed. Only responsible purchasers need apply. Box B-90, The Oil and Gas Journal, Tulsa, Okla.

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Will exchange 3,000 acres oil leases on favorable structure, Henderson County, Kentucky, for 2,000-foot test well. J. F. Hyatt, 5900 Michigan Ave., Chicago, Ill.

OFFSET to best well Artesia, New Mexico, field. Six good sands between 1,600 and 2,800 feet. Will donate lease for well subject overriding royalties. Absolutely proven locations. Act quick. Address P. O. Box 123. Tulsa, Okla.

FINANCE your project with bonded stock. Quickest and most satisfactory known method of raising capital. Booklet free. Bankers Interstate Security Co., Electric Bldg., Denver, Colo.

DO YOU NEED MONEY for organizing or financing oil or mining deals? Write 35 E. Tenth. Oklahoma City, Okla.

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INCORPORATE in Nevada. Broad powers and privileges. Stock non-assessable, non-par, non-voting, classified, no license tax. Inexpensive filing fees and yearly cost. Corporate Service Association, Alexander Bldg., San Francisco, Calif.

DELAWARE incorporators. Charters fees small, forms. Charles G. Guyer, 901 Orange St., Wilmington. Del.

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Before disclosing your invention to anyone, send for blank form
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Bullein "How to Establish Your Rights" and complete information free.

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Simplex Emergency Jack No. 310

No. 310—Capacity 15 tons
Single acting—automatic lowering

No. 310 is known as the Jack of a hundred uses. A standby in every oil field. Operates at any angle or vertically.

Built with drop forged steel working parts and furnished with five foot steel chain—steel auxiliary claw and steel level bar.

Unsurpassed for extricating stalled motor trucks—jacking steam engines—raising and setting boilers, raising sand reels and casing sills, skidding rigs and moving tanks and heavy machinery.

—

Templeton, Kenly & Co., Ltd.
Established 1899
Sole Manufacturers of the Simplex Jacks
Chicago, Ill., U.S.A.

Simplex Jacks are sold by the supply houses that are leaders in every oil field.

BILLION GALLONS MONTH, PRODUCTION FOR 1926

(Continued from Page 210)

problem is not the relation of plant capacity to throughput, but of throughput to the absorbing capacity of the markets for the finished products.

Referring to Table 3 we find that during the first 11 months of 1925 our domestic production plus imports of gasoline amounted to approximately 10,061,000,000 gallons—or a daily average supply of 30,120,000 gallons. During the same period our domestic demand plus exports totaled 9,477,000,000 gallons—or a daily average demand of 29,250,000 gallons.

Piling Up Surplus

This means that during the first 11 months of 1925 we piled up a daily surplus of 870,000 gallons. This sounds big, and dangerous—only when you isolate it from a daily demand almost 35 times as great. This daily average surplus really means that during the first 11 months of 1925 our production plus imports was only about 3 per cent greater than our domestic consumption plus exports.

Table 3—Gasoline Balance Sheet for First 11 Months of 1925

	Gallons
Stock, January 1, 1925	1,298,926,000
Domestic production	9,914,578,000
Imports	146,689,000
Total	11,360,193,000
Exports	1,196,586,000
Domestic demand	8,573,727,000
Stock, November 30, 1925	1,589,880,000
Total	11,360,193,000

That's a record of "efficiency," and of adjusting supply to demand, on a huge scale, that any industry could be proud of.

Increase in Recovery

Probably the most interesting thing in connection with Table 1 is the increases in the recovery of gasoline, for the United States as a whole, from 33.2 per cent in 1924 to 34.8 per cent in 1925.

And this means that the average recovery in 1926 will be over 35 per cent.

The constantly increasing capacity of cracking plants and the increasing efficiency of other refinery equipment, along with improved refinery practice, will more than offset the present slow decline in the gasoline content of the average crude as it comes from the well. As oil fields "ebb and flow" the relative proportions of high gravity and low gravity crudes vary—and we know today that it is only a question of time as to when the pendulum will again swing towards higher gravity crudes.

Fuel Oil Output

During no month of 1924 did the refinery output of fuel oil drop below 1,000,000,000 gallons—the daily average for the year being 36,775,000 gallons.

July, 1925, saw the peak of our fuel oil production—an average of 46,600,000 gallons a day. The average for the first 11 months of 1925 was 41,860,000 gallons a day.

On the basis of the first 11 months, the output of fuel oil for the year 1925 should be about 15,200,000,000 gallons. This is an increase of almost 13 per cent over 1924.

If this percentage of increase holds good for 1926 it will mean that we will make about 17,000,000,000 gallons this year, or over 46,500,000 gallons a day.

Just exactly what this means can be realized by turning the daily output of fuel oil into tank cars—4,650 of them—enough to make a "fuel oil train" 35 miles long, every day in the year.

Out of every 100 bbls. of crude oil that go through the refineries in California, and also in the Arkansas-north Louisiana area, about 70 bbls. come out fuel oil. In California about 22 bbls. would be gasoline—and in Arkansas-north Louisiana about 19 bbls. would be gasoline.

Difference in Crude

In the first 11 months of 1925 the refineries in Oklahoma-Kansas averaged almost 49 per cent gasoline and about 38 per cent fuel oil. And probably no other statement could be made that would set forth more clearly the essential difference between the average crude produced in Kansas-Oklahoma and the average crude produced in California and also in the Arkansas-north Louisiana area—and especially in Arkansas.

In the area east of California the stock of fuel oil on hand November 30, 1924, was less than on January 1, 1924. But the stock on hand November 30, 1925, was over 300,000,000 gallons more than on January 1, 1925. Of this increase, 190,000,000 gallons come from the Southwest—48,000,000 gallons from the Rocky Mountain area, and 85,000,000 from the area east of the Mississippi. The last available figures for fuel oil stocks in California (April, 1925) placed the figure at slightly over 876,000,000 gallons—and in the light of the large increase in refinery runs in California in recent months, the stock of fuel oil, if it could be segregated from low gravity crude, would undoubtedly not be less than it was last April.

Adding approximately this amount, as the present stocks of fuel oil in California, to the 1,145,000,000 gallons in storage east of California, would give a grand total for the United States of about 2,000,000,000 gallons, as compared with an average stock of about 1,500,000,000 gallons during the year 1924.

Summarizing gasoline and fuel oil for the entire year 1925 (based on the first 11 months) we have a total output of gasoline of about 10,800,000,000 gallons and stocks of about 1,600,000,000 gallons—of fuel oil the output was about 15,200,000,000 gallons and the stocks (including California on the basis as stated) about 2,000,000,000 gallons.

If these stocks are too heavy—and if heavy stocks have a depressing effect on the market price of gasoline and fuel oil—then the oil industry itself is "the loser." And the millions of people who use gasoline and fuel oils are the beneficiaries.

NOTICE TO FILE CLAIMS

OKLAHOMA CITY, Okla., Jan. 9.—T. C. McMurray of Fort Worth, Tex., receiver of the North American Oil & Refining Corp. of Oklahoma City, has given notice that all claimants or intervenors must file their claims with the receiver on or before January 25 or thereafter be forever barred. An order to this effect was made by Judge James C. Wilson of the United States District Court of Texas. The North American passed into receivership last year when the Roxana Petroleum Corp. obtained a judgment in a suit involving contracts and about 6,000 acres of leases and oil production in Young County, Texas.

DEATH OF JOHN C. SMITH

John C. Smith, oil operator and a brother-in-law of Maj. Gen. Leonard Wood, Governor General of the Philippine Islands, died at his home in Denver following a stroke of paralysis. As president of the Eclipse Oil Co. Mr. Smith was one of the first to open up the Salt Creek oil field in Wyoming. Since that time Mr. Smith has made his home in various parts of Colorado, Wyoming, Kansas and Oklahoma, developing oil fields in these States.

PENNSYLVANIA GRADE ASSOCIATION ELECTS

PITTSBURGH, Pa., Jan. 9.—Clayton G. Dorn of the Forrest Oil Co., Bradford, was elected president of the Pennsylvania Grade Crude Oil Association, to succeed Edmund C. Breene of Oil City, at the annual meeting of the board of directors held here.

Vice President J. P. Flynn of Sistersville, W. Va., Recording Secretary E. M. Lyons, Tiona Refining Co., Clarendon, Pa., and Treasurer Samuel Messer of Oil City were elected to succeed themselves.

R. J. Alexander will continue as executive secretary with offices in Oil City.

The appointment of I. H. Shearer, Kendall Refining Co., Bradford, to succeed P. C. Hubbard of the same company, as director, was approved. Mr. Hubbard recently severed connections with this company.

The 1925 finance committee, consisting of David B. McCalmont of Franklin, C. L. Suhr and Samuel Messer of Oil City, were reappointed and will continue close supervision of association expenditures.

Services of Messrs. Young and Rubican, who have handled the association's advertising since beginning the Pennsylvania grade oil campaign, were retained.

Expressions of favorable results obtained during the past year in advertising the superior qualities of Pennsylvania grade oil were heard from many sources.

ONLY SMALL WELLS IN EAST CENTRAL TEXAS

CORSICANA, Tex., Jan. 9.—Small wells and failures and some new work started, summed up the week's news from East Central Texas fields.

In Navarro County, the Simms Oil Co.'s No. 7 Kellum, Greer survey, is a 500,000-foot gasser at 1,071-1,125 feet. The Mutual Oil Co.'s No. 12 Howell, Matthews survey, was good for 50 bbls. the first 24 hours from sand at 991-1,015 feet, and No. 7-B Howell made 56 bbls. the first day from shale at 1,023-37 feet. Kerr & Gillette abandoned No. 1 Dr. Sneed, Hudson survey, Richland district, at 3,033 feet. It had no showings at any level. Dixon and others had a showing of 15 feet of oil and water at 370 feet in a test on the Laird farm, Boren survey, Richland district, which they will test.

In Freestone County, the Pure Oil Co. abandoned at 678 feet its No. 2 Seals, McNulty survey, after salt water had broken in.

In Limestone County, the Humble Oil & Refining Co. was drilling below 400 feet in its No. 4 Finch, McNulty survey. J. K. Hughes was below 500 feet in No. 18 Ellis, Varela survey, Groesbeck district. Morley & Morley were cleaning out at 1,800 feet in their No. 1 Head, G. Young survey. This test is at a total depth of 4,560 feet.

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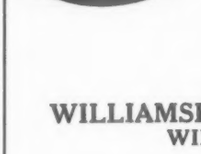

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Fuel Oil on Open Market and Contracts

Latter in 1925 Netted Refiners More Than Former Due to Depressing Effect of Smackover Heavy Crude Oil Production

By C. O. Willson

The opening of the new year has found many contracts pending between Mid-Continent refiners and southwestern railroads covering the fuel oil requirements of the latter for the year 1926. December and January generally witness the closing of most of these contracts, but the last month of 1925 developed little, if any, new agreements.

These contracts in one form or another have been entered into for several years by the railroads and many refiners. The use of fuel oil by railroads in the southwest has shown a steady increase despite the keen competition of coal. Many refiners have been willing to supply this fuel oil through contracts, although there have been periods during the past five years when they would have secured more for the residuum of their plant operations if they had sold it from week to week on the spot market.

Generally these long time agreements have been based on the posted price of crude at the wells. In the beginning when refiners were asked to enter into yearly contracts, they were unwilling because they could not accurately foretell what their crude costs would be a year in advance. Anyone who has watched the ups and downs of the crude market within a 12-month period and from year to year is aware of the truth of the refiners' contentions. Out of this uncontrollable situation developed the contract based on the price of crude.

The refiners were willing to enter into an agreement which assured them that regardless of how high or low crude prices went during the course of the year, they would be protected with a fixed percentage price for their fuel oil. The railroads naturally would have preferred a flat price, but realizing this was impossible in dealing with a refinery organization without its own crude supply accepted the percentage contracts. With rare exceptions these contracts have been satisfactory both to the seller and buyer evidenced by the fact that the agreements have usually been renewed with some changes as to terms from year to year.

Increase in Percentage

The outstanding development in these contracts for the several years they have been in effect has been the gradual increase in the percentage basis allowed the refiner. A few years ago contracts are known to have been entered into in which the sellers were satisfied with 50 per cent of the crude price for their fuel oil. During the past year several refiners secured better than 70 per cent of their crude costs at the wells for the fuel output.

Several reasons have been advanced for this development. The most important can be summarized with the statement that market outlets have been developed gradually during the past few years so that the heavy ends of petroleum are worth more in relation to crude prices than they were previously. This applies to the railroads although probably not so much as to other classes of consumers. Through improvements in burners, furnace design and methods of operation the railroads have been able to secure greater economy in fuel oil burning and this naturally has increased its value when compared to other fuels.

However, the most important explanation of higher fuel prices has to do with the use of distillates and residuums for fuels in homes, office buildings and similar type structure together with the art of cracking in refinery operations. Both these developments have added to the value of that part of the crude left after the gasoline and kerosene cuts have been obtained in the usual skimming methods.

No accurate data are available showing the increase in the use of distillates as fuels, but the hundreds of different type burners placed on the market and their widespread installation by home owners has been reflected in a constantly mounting demand from refiners. In supplying this demand the trend has been to cut deeper into the crude leaving less residuum to be sold as ordinary fuel oil. In this connection it is also well to keep in mind that a few burners will burn the higher gravity fuel oils without blending. Many distributors buy fuel oil as well as distillates and blend the two before selling to their customers. This new demand has thus both reduced the percentage of fuel oil available from crude and is also bringing a class of consumers willing to pay higher prices.

Effect of Cracking

Of probably greater importance than the enlarged fuel market is the development of the cracking process. Not only have the number of the installations increased, but the processes are being perfected to handle lower gravity charging stocks with a few installations in the Mid-Continent Field in which all residuum from the skimming plant operations is being charged to the cracking stills. The net result of the latter operations is the doing away of the fuel oil output of those plants. Before this year is half over refineries handling better than 80 per cent of the crude refined in the Mid-Continent Field will have cracking equipment. This means a constantly decreasing percentage of fuel oil from crude for the entire Mid-Continent Field, a trend which will increase until that equilibrium is reached where the further cracking of the heavy ends into gasolines is not economically justified.

The check on this trend is obviously the price obtained by the refiner for fuel oil. Prices for the latter can be advanced to the point where in relation to the prevailing crude and gasoline prices, the refiner can better afford to sell a certain percentage of his crude oil as fuel rather than by additional processing secure the maximum possible yield of gasoline and other light end products.

The Table

The accompanying table was prepared to show at a glance the yearly and the month to month relationship for 1925 between the open market quotations on fuel oil in Oklahoma and North Texas and representative contracts. One of the largest railroads buyers in the southwest had contracts with several Oklahoma refiners similar to that referred to as No. 1. The No. 2 contract was also used in North Texas and Oklahoma.

The average figures for the year clearly show that the contract agreements were favorable to the refiners. The average weekly price of $1.42 and $1.21 for the contracts compared with $1.09 and $1.16 averages covering the weekly spot prices based on the low quotations of The Oil and Gas Journal. This spread in favor of the contracts is greater than for several years. In 1923 and 1924 considered for the entire year the contract prices were only slightly greater than the open market quotations. The contracts are not entered into at the same time of the year and they are not all based on the same grade crude. For these reasons the data given in the table does not accurately show the prices secured by all the refiners which had contracts in 1925.

Due to the relatively wide spread between the contract and open market prices the railroads in their renewals for 1926 are attempting to secure what they consider a more favorable agreement. The railroad which had the No. 1 contract is reported to be seeking a base price of $1.20 with the same 60 per cent for any advance or decline in crude. The No. 1 contracts which have not been terminated are now netting the refiner $1.37 as shown in the table. Under the proposed agreement the refiner would consent to a reduction to $1.20 and this would then be the base price for the coming year. The 36 gravity crude as posted by the Prairie Oil & Gas Co. in the Mid-Continent was $1.25 in January, 1925, when the agreements were entered into for 1925. This year the price for the same grade is $1.79. Thus the base price of $1.00 last year was 80 per cent of the crude price, while the proposed agreement for this year would be 67 per cent. This means that if the latter agreement is accepted by the refiner he will secure a substantial reduction in the percentage price regardless of whether crude advances or declines.

Effect of Smackover

In addition to the general upward trend in fuel oil prices when compared to crude prices, previously explained, market students point to another condition which they state refiners should consider before agreeing to a reduction in their contract agreements. This has to do with the effect the large production of heavy Smackover crude oil has had on the spot fuel oil prices during the past year. This production—unexpected at the time last year's contracts were entered into—has totaled to date approximately 50,000,000 bbls. Not wanted by most refiners and with pipe line facilities inadequate for a time to care for the flood of production, large quantities have been sold as fuel oil. Despite this condition spot refinery fuel oil prices in Oklahoma and North Texas averaged higher in 1925 than in 1924 or 1923. With Smackover eliminated spot prices would have been higher, however, and the average spot prices for the year would probably have been as high as those obtained under the contracts.

Refiners and other market observers who have given serious consideration to the several conditions of which the foregoing has been a brief outline are loathe to accept any agreement for the coming year which seeks to lower the percentage relationship between crude and fuel oil prices. Barring developments which cannot be foreseen at this time, they expect higher fuel oil prices based on the spot market and a relatively high relationship between those prices and crude price schedules.

Table showing relationship for 1925 of spot fuel oil prices in Oklahoma and North Texas and representative contracts for the same areas based on crude price schedules. Spot prices based on low weekly quotations of The Oil and Gas Journal. All prices per barrel.

	Dy. Aver. Cr. Price 36° Bm.	Weekly Aver. Fuel Oil Contr'ts *No. 1	Weekly Aver. Fuel Oil Contr'ts *No. 2	Weekly Aver. Spot Mkt. F. Oil Okla. (Gp. 3)	Weekly Aver. Spot Mkt. F. Oil N. Tex.	Incr. of No. 1 Contract Over Okla. (Gp. 3)	Incr. of No. 1 Contract Over N. Tex.	Incr. of No. 2 Contract Over Okla. (Gp. 3)	Incr. of No. 2 Contract Over N. Tex.
January	1.34	1.06	.87	1.28	1.28	—.22	—.22	—.41	—.41
February	1.87	1.42	1.21	1.28	1.40	.14	.02	—.07	—.19
March	2.00	1.50	1.30	1.15	1.25	.35	.25	.15	.05
April	2.00	1.50	1.30	1.03	1.11	.47	.39	.27	.19
May	2.00	1.50	1.30	.91	.92	.59	.58	.39	.38
June	2.00	1.50	1.30	.92	.94	.58	.56	.38	.36
July	2.03	1.53	1.32	.91	.95	.62	.58	.41	.37
August	2.00	1.50	1.30	1.05	1.10	.45	.40	.25	.20
September	1.79	1.37	1.16	1.03	1.09	.34	.28	.13	.07
October	1.79	1.37	1.16	1.05	1.07	.32	.30	.11	.09
November	1.79	1.37	1.16	1.21	1.25	.16	.12	—.05	—.09
December	1.79	1.37	1.16	1.26	1.48	.11	—.11	—.10	—.32
Average	1.87	1.42	1.21	1.09	1.16	.33	.26	.12	.05

*No. 1 contract based on price of $1.05 on January 1 with seller obtaining 60 per cent of all advances of 36° crude. *No. 2 contract based on 65 per cent of 36° gravity crude.

GULF CO. ACQUIRES COLOMBIA INTEREST

NEW YORK, Jan. 9.—The Gulf Corp. has acquired a three-fourths interest in the Barco concession in Colombia, South America, the Carib Syndicate retaining one-fourth interest, according to statements made in trade circles. The interest acquired by the Gulf organization was previously held by H. L. Doherty & Co. The concession covers 1,000,000 acres of potential ore-bearing lands.

It was generally assumed that the acquisition of this interest in the Barco concession by the Gulf Oil Corp. would result in the immediate development of the field.

PENNSYLVANIA MARKET REPORTS A DULL WEEK

OIL CITY, Pa., Jan. 9. — The past week has been a very dull one in the Pennsylvania refined oil markets. Nothing startling developed during the whole week and the market as a whole was slow without many sales being reported.

Gasoline held steady during the week and there were practically no price changes.

There was no demand for kerosenes and naphthas during the week and the prices remained about the same with the exception of kerosene, which showed a decrease of ⅛ to ¼ cent.

The demand for fuel oil was fairly good during the week and the prices remained firm.

Wax was weak and prices were slightly lower.

The demand for cylinder stocks was also absent.

CALIFORNIA MARKET CONTINUES OPTIMISTIC

LOS ANGELES, Calif., Jan. 9.—No important price changes developed in refined products during the past week. Optimism continues among the sellers with the outlook for the gasoline market brighter than at any time in several months.

The demand for the domestic grades of refinery gasoline continues steady with an improvement in the export demand. The absorption natural gasoline market is usually strong and little material for spot shipment is available. Fuel oil, kerosene and distillates are unchanged.

MORE GAS FOR WALTERS

OKLAHOMA CITY, Jan. 8.—The Lone Star Gas Co. is laying a 4-inch pipe line from its main line in Stephens County to Walters and will sell gas to the Walters Gas Co. The town's source of supply has been a well 2 miles northwest.

Oil Securities Were Active and Lower

Considerable Selling Developed in Issues Which Had Made the Most Substantial Gains. Some Off Two to Five Points

By N. O. Fanning
Room 543, 30 Church St., New York

NEW YORK, Jan. 11.—Oil securities were active and lower during the past week. Irregularity changed to weakness when considerable selling occurred in stock which had been making the most substantial gains, such as Humble Oil, Vacuum Oil and the Pan American Petroleum issues. Losses of 3 to 5 points occurred in these stocks.

Oil stocks displayed considerable irregularity during the opening days of 1926, in contrast to the buoyant tone in the week before and after Christmas. This was commented upon favorably in many quarters, inasmuch as it had been feared the opening of the year would witness over-optimism on the part of the oil industry. A continuance of irregularity during the first month or two would not by any means indicate expectations for a bad year for oil.

There were some notable exceptions to the ruling tendency in oil securities, however. Associated Oil advanced to a new high for all time at 49½. Pacific Oil made a new high at 78⅝, or ⅛ of a point beyond the previous high. Standard of California stock at the same time dropped off a point or two to 58¾.

Among the low-priced oils there were some strong spots, especially Superior Oil, which advanced beyond 4.

Mexican Panuco Oil

Notice of a special meeting called for January 26 to consider an increase from 500,000 to 1,000,000 shares of $10 par value to provide for further extensions in South America was sent to stockholders of the Mexican Panuco Oil Co. The company recently acquired concessions of 2,000,000 acres in South America. The announcement says, in part: "Directors have already authorized the acquisition of one property, pending adoption of the increase in capital, and has under consideration several others which they believe can be acquired on favorable terms."

The California Merger

Directors of the Pacific Oil Co. have voted to distribute to shareholders of record January 26 two-fifths of a share of the capital stock of the Associated Oil Co. and $3 in cash for each share of Pacific Oil held. Adequate reserves are to be maintained to liquidate any undetermined liabilities, and it has been provided that with the settlement of such liabilities, if any arise, the remaining assets will be distributed to shareholders.

Holdings of Associated Oil stock in the Pacific Oil Co.'s treasury have increased since December 31 from 1,229,575 to 1,400,000 shares through exchange of certain Pacific Oil properties in the west for additional stock. The distribution will be comprised partly of accumulated earnings and partly of capital assets.

As early as possible after the March 6 disbursement, and it is hoped before March 15, the properties, other than those distributed will, says a statement by Henry W. de Forest, chairman of the executive committee of Pacific Oil, be transferred to a new company, and to that same company will be transferred all of the assets of the Standard Oil Co. of California.

The new company, as stated recently, will issue its shares in exchange for those of the two companies to be consolidated on a pro rata basis. Thus the Pacific Oil Co. will receive 3,500,000 shares and the Standard Oil Co. of California 9,500,000 shares. There is a possibility that the Standard Oil Co. of California may continue its corporate existence, in which event 3,500,000 shares of its stock will be exchanged for the Pacific Oil capitalization.

A special meeting of stockholders of the Pacific Oil Co. has been set for February 26 to ratify the proposals necessary to permit the carrying out of the deal.

Associated Oil

In connection with plans for a merger of Pacific Oil properties, it appears that Associated Oil, through a subsidiary of Pacific Oil now, will not be a part of the consolidated company.

The distribution of the majority of stock held by Pacific Oil in Associated to individual stockholders of the Pacific company may result, it is believed, in the possibility of an ultimate change in management of Associated.

The failure to make Associated Oil a subsidiary of the combined company through the sale by Pacific Oil of its 1,400,000 shares of Associated stock to the new concern "en bloc" has puzzled many students of the situation, who also wonder why Standard of California interests did not wish to include Associated in the new company, or if they did, why matters did not occur in that way.

Louisiana Oil-Beacon Oil

Proceeds from the sale of $4,000,000 new convertible preferred stock of the Louisiana Oil Refining Co. will be used in part to retire outstanding 5½ per cent notes, and also to acquire an interest in the Beacon Oil Co. of Massachusetts, according to Richard B. Kahle, president of the Louisiana organization. Mr. Kahle called a special meeting of stockholders to be held January 18 for the purpose of approving the new issue of preferred.

Mr. Kahle in his letter to stockholders says the company has sufficient working capital for daily operations, adding that "for 1925 it has been necessary to make several adjustments and take some losses on the books, due to the affairs of prior years, and these old adjustments, we believe, are now all taken care of and we expect a net profit of $1,200,000 applicable to the common stock, after depreciation and depletion."

The company has $2,800,000 of 5½ per cent notes outstanding for which it has to set aside $700,000 annually to take care of serial maturities. The new preferred stock will be offered to stockholders on a pro rata basis. It has been underwritten by a local banking group.

Public offering of a block of the capital stock of the Beacon Oil Co. will be made by a local banking syndicate, according to reports. This offering will be in connection with the proposed acquiring of an interest by the Louisiana Oil Refining Co.

The authorized capital stock of the Beacon Oil Co., which operates chiefly in New England, has been increased from 192,000 to 1,000,000 shares, all without par value. Of the increased stock, 160,000 shares will be offered at $25 a share, raising $4,000,000 of new capital. The remaining 648,000 shares will be distributed to common stockholders, either as a whole or in part, as a stock dividend, at the discretion of the board of directors. The Massachusetts Gas Corp. owns 44½ per cent of the common stock of the Beacon Oil Co.

Swiss Oil Corp.

The Swiss Oil Corp., of Indianapolis, Ind., which has purchased control of the Union Gas & Oil Co., is controlled by Lexington, Ky., and Chicago financiers, while the Union Co. was controlled by Arthur B. Ayres of Fortville and New Castle, Ind.; Frank M. Millikau, Indianapolis, and A. C. Albion, Newman, Ill. A cash payment of $2,500,000 was made and a mortgage executed to remove a $2,500,000 balance of the purchase price. Twelve notes for $200,000 each were given, these falling due in quarterly periods, the last one on April 1, 1929.

The property of the Union Gas & Oil Co. consists of more than 500 producing oil wells in eastern Kentucky. Mr. Ayres, who has connections with the Standard Oil interests, started the development of the property 8 years ago.

Thomas A. Combs was elected president of the Union Oil & Gas Co. in the reorganization which followed the transfer of stock and property.

Increased Interest

Renewed interest in oil is indicated by the numerous "deals" affecting oil properties in different parts of the country. Another evidence of this is shown by the Journal of Commerce compilation showing that petroleum companies with aggregate capital of $273,445,000 in December and $437,210,000 in November were organized in the United States, the highest monthly totals in about three years.

In 1925 companies capitalized at an aggregate of $1,890,726,000 were organized, compared with $787,031,000 in 1924.

Pure Oil Co.

Directors of the Pure Oil Co. will meet in Columbus, Ohio, on January 25 to take dividend action. It was reported that

(Continued on Page 229)

NEW YORK STOCK EXCHANGE—LIST OF ACTIVE STOCKS

Stocks—	Par	Clos. Quot. Jan. 11	Jan. 4	1925 High	1925 Low	1924 High	1924 Low	1923 High	1923 Low
American Republics	..	70	*70	79¾	48	48	25	..	..
Associated Oil	25	50	46	47¼	32	34⅝	27⅝	29¼	29½
Atlantic Ref., com.	100	106¾	108	117½	95½	140½	78½	100	98¾
Barnsdall "A"	25	32	32	33½	18¾	29½	14	37	9⅞
California Pet., com.	25	32½	33½	34⅞	23⅞	29	19⅞	28½	17½
General Petroleum	25	57	57⅞	59	42	45	38⅝	..	..
Houston Oil	100	70½	69½	85	59	82½	61	78	40¾
Independent Oil & Gas	..	31⅝	32¾	41¾	13½	16¼	5¾	11¼	3⅝
Indian Refining	10	11⅜	12⅜	14¼	5½	7	8⅝	8½	4
Louisiana Oil	10	17⅞	19	23⅜	13⅜	..	..	..	..
Maracaibo	..	26½	26⅞	35½	20⅝	37½	25⅝	28¼	16
Marland	..	57⅝	59	60½	32⅝	42	29	50⅝	18½
Mexican Seaboard	..	10⅝	11½	22½	9	25⅝	14½	19⅝	5¾
Mid-Continent Pet.	..	35	36½	38	25⅝	40¼	22⅝	62¼	23¾
National Supply	50	56⅜	56	71	54⅝	72½	54	68	54
Oil Well Supply	25	32⅞	33	38	33⅝	..	..	..	..
Pacific Oil	..	76¼	75	78½	51¼	58¼	46	52½	31½
Pan. Amer. P. & T., com.	50	67⅞	76¼	83⅞	59½	65	44½	83½	53
Pan. Amer., Western B	..	40⅜	45	49⅜	37¼	..	..	..	..
Phillips Pet.	..	44¼	46½	47⅛	36¼	42¼	28½	69⅝	19¾
Producers & Refiners	50	15½	16	32⅝	12⅛	43½	29⅜	58¾	17⅛
Pure Oil, com.	..	29⅜	30⅝	33⅜	25½	30¼	20	32	16½
Royal Dutch, N. Y., sh.	13.40	56⅛	57	57⅝	48¼	59½	40⅝	56⅛	40½
Shell Transport	10	48⅛	48⅝	49	39⅝	42	33	41¼	29⅛
Shell Union, com.	..	27⅝	27⅞	28⅜	21⅝	22½	15⅜	19¼	12⅝
Simms Pet.	10	25½	26⅜	28½	17⅞	24	10⅜	16⅜	6½
Sinclair Consolidated, com.	..	21⅝	23¼	24⅞	17	17½	15	39⅜	16
Skelly Oil	25	30⅝	31⅜	32½	21⅜	29	17⅛	35	12⅛
Standard of California	25	58⅝	61	67¼	51½	68½	55½	64½	47¼
Standard of N. J., com.	25	44⅝	45½	47⅛	38⅝	42½	33	44¼	30⅞
Sun Oil Co.	..	39½	41	43⅞	38½	..	..	..	..
The Texas Co.	25	52⅛	54¼	55	42⅜	45⅝	37¾	52⅞	45⅝
Texas Pacific Coal & Oil	10	18¼	18⅝	23⅝	11	15¼	8¼	23¾	5½
Tide Water Oil (new)	..	34½	35	‡152	122	151	116¼	144	94
Transcontinental	..	4⅝	4⅝	5⅞	3½	6¼	3⅜	14¼	1¼
Union Oil of California	25	38⅝	40⅞	43⅜	33⅛	39	35½	..	..
Union Tank, com.	100	93	92½	‡134	118	132⅝	94	114	106
White Eagle Oil & Ref.	..	27½	28	31⅝	25⅝	29⅝	23⅛	30⅜	29½
Standard Oils									
Anglo-American Oil	£1	19¼	19⅝	26¾	17⅛	18⅜	14⅝	19⅜	13½
Borne Scrymser	100	*228	230	240	205	264	150	153	210
Buckeye Pipe Line	50	55¾	56⅛	72	53½	85½	51	94	57⅛
Chesebrough Mfg. Co.	25	69½	71	74	48¼	52¾	29¼	340	205
Continental	10	24⅛	26½	31⅛	21⅝	..	..	..	..
Crescent Pipe Line	25	*15	*15	17½	10	20	11¼	25	15
Cumberland Pipe Line	100	*134	137	156	128	148	108	117	80
Eureka Pipe Line	100	*61	*62½	96	61½	105	74	117½	67
Galena Signal, com.	100	29	28⅛	68½	23½	69⅝	52½	78	55
Humble Oil & Refining Co.	25	92	99	99	42⅜	43⅝	36	41	28¼
Illinois Pipe Line	100	135½	135½	154½	124	161	123	171	115
Imperial Oil (Ltd.)	..	36¼	38	39¼	27½	119	99	123	92
Indiana Pipe Line	50	58⅝	*58½	84	57⅜	110	66	103	81
International Pet. Co.	10	32½	34⅝	35⅝	22⅛	24⅝	16⅞	24⅜	13¼
National Transit Co.	12.50	18½	18¼	25½	16½	25⅞	20⅝	20	19⅛
New York Transit	100	49	*52	79	50	97	54½	138	70
Northern Pipe Line	100	71¼	*73	88	67½	107½	72	111	96
Ohio Oil Co.	25	64	66⅝	75¼	60	79⅛	53	85⅝	48⅝
Penn.-Mex. Fuel	25	20	22	44	19	35⅝	27	45	10½
Prairie Oil & Gas	25	55¾	58½	65½	45⅞	269	193	272	152
Prairie Pipe Line	100	126½	126	129⅝	106	111	100	117	93
Solar Refining Co.	100	203	210	259	200	240	170	212	161
South Penn Oil	100	190	191½	197	139	176	117	196	100
Southwest Pa. Pipe Line	100	*52½	*52½	84	50	89	68	89	66
Southern Pipe Line	100	*63	66	103	63	100	80½	116	87
Standard of Indiana	10	66	70¼	70⅝	59½	69⅜	54¼	69⅝	48½
Standard of Kansas	25	33½	36¼	46	30¼	50½	32½	56¼	36½
Standard of Kentucky	25	133½	*133½	137	114⅝	121⅝	101	109½	76
Standard of Nebraska	100	*243	248	270	231	263	198	260	186
Standard of New York	25	46¼	46⅜	48⅝	40	48	37⅜	49⅜	35½
Standard of Ohio, com.	100	351	362	369	338	337½	277	320	270
Swan & Finch, com.	25	*21	23	27	12	28	20	..	..
Vacuum Oil	25	104	108½	109½	80½	83½	50½	55½	40
Washington Oil	..	*50	*55	55	30	30	25	28	20¼
Miscellaneous									
Gulf Oil Corp. of Pa.	25	92⅛	91⅛	98¼	63½	67⅞	56	68¼	45⅝

*Bid, no sales. ‡Old stock.

The Oil and Gas Journal's weekly average of 20 representative petroleum stocks listed on the New York Stock Exchange was as follows:

Jan. 11	57.55	Dec. 7	57.99	Nov. 2	55.67
Jan. 4	59.15	Nov. 30	56.93	Oct. 26	55.61
Dec. 28	59.40	Nov. 23	56.49	Oct. 19	50.03
Dec. 21	56.86	Nov. 16	57.31	Oct. 10	52.18
Dec. 14	56.89	Nov. 9	56.47	Oct. 5	52.94

AMERICAN PETROLEUM INSTITUTE CONVENTION PROGRAM

(Continued from Page 29)

"Purchase of Lubricants on a Quality Basis." H. C. Dickinson, United States Bureau of Standards.

Group 3—General Topic: Uniform Methods of Oil Accounting. (Conference Room 3).

"Uniform Methods of Oil Accounting." Committee Report: M. W. Mattison, Chairman.

"The General Balance Sheet." General Discussion.

Group 4—General Topic: Natural Gasoline. (Ballroom Foyer).

(Note—This is a joint session between members of the Institute and the Association of Natural Gasoline Manufacturers. The program has been arranged by the latter named organization.)

Presiding: Harry J. Bauer, Pacific Gasoline Co.

"Natural Gasoline—Its Present Position and Future Outlook." E. L. Peck, President, Association of Natural Gasoline Manufacturers.

Discussion, led by A. M. Ballard, Sun Oil Co.

"What Is Good Natural Gasoline From the Standpoint of the Refiner?" (Speaker to be announced.)

Discussion, led by R. E. Bering, California Gasoline Corp.

AFTERNOON

2:00 p. m. Group Meetings:

Group 1—General Topic: Standardization of Oil Field Equipment. (Ballroom).

"Standardization of Rig Irons." Committee Report: H. J. Lockhart, National Chairman.

"Standardization of Rotary Drilling Equipment." Committee Report: Capt. J. F. Lucey, National Chairman.

"Standardization of Wire Rope and Manila Cordage." Committee Report: C. C. Sharpenberg, National Chairman.

"Standardization of Pumping Equipment and Engines." Committee Report: A. V. Hoenig, National Chairman.

"Standardization of Steel Storage and Production Tanks." Committee Report: G. M. Vandaveer, National Chairman.

Group 2—General Topic: Fire Prevention and Protection in the Petroleum Industry. (Music Room).

"Protection Against Static in Petroleum Marketing." J. A. Watterson, Standard Oil Co. (Ohio).

"Steam Protection for Oil Tanks." G. O. Wilson, Standard Oil Co. (California).

"Fire Prevention and Protection in the Petroleum Industry." G. H. Haupt, Standard Oil Co. (New Jersey).

Group 3—General Topic: Uniform Methods of Oil Accounting. (Conference Room 3).

"The General Balance Sheet."—Discussion continued.

Group 4—General Topic: Natural Gasoline. (Ballroom Foyer).

(Note—This is a joint session between members of the Institute and the Association of Natural Gasoline Manufacturers. The program has been arranged by the latter named organization.)

Presiding: Harry J. Bauer, Pacific Gasoline Co.

"Methods of Manufacture, Past and Present." F. E. Rice, Phillips Petroleum Co.

Discussion led by S. B. Mosier, Signal Gasoline Co. of California.

Subject to be announced: D. E. Buchanan, Chestnut & Smith Corp.

Discussion, led by F. S. Wade, Lomita Gasoline Co. of California.

THURSDAY, JANUARY 21

(Note—The morning and afternoon on this day will be devoted to group sessions, arranged by general topics, at which the various subjects will first be treated in addresses by selected speakers. After each speaker has finished, opportunity will be given for general discussion of the subject. The Annual Dinner will be at 8 o'clock in the evening.)

MORNING

10:30 a. m. Meeting of Board of Directors. (Conference Room). (Luncheon for members of the board at noon in Conference Room 7).

10:00 a. m. Group Meetings:

Group 1—General Topic: Improvement of Oil Drilling and Production Methods and Equipment. (Ballroom).

"The Trend of Electrification in the Petroleum Industry." H. E. Dralle, Westinghouse Electric & Manufacturing Co.

"The Hild Electric Drive." Thomas Fleming, Jr., Oil Well Supply Co.

"Oil and Gas Engines." Pat Shouvlin, Superior Gas Engine Co.

Group 2—General Topic: Oil as Fuel. (Ballroom Foyer).

"Domestic Oil Burning." J. C. Johnson, S. T. Johnson Co.

"Status of the Oil Burner in the Heating Industry." Homer Linn, American Radiator Co.

"Oil Burning on the Pacific Coast." J. B. Arthur, Union Oil Co.

"Oil as Fuel for Electric Transportation." J. C. Thirlwall, General Electric Co.

Group 3—General Topic: Uniform Methods of Oil Accounting. (Conference Room 3).

Presentation of prepared papers on Chart of Accounts for:

Production Department.

Casinghead Gas Department.

Refinery Department.

Sales (Marketing) Department.

General discussion.

Group 4—General Topic: Oil Transportation by Railroad. (Music Room).

"Seeking Safety in Railroad Transportation." Col. B. W. Dunn, Bureau of Explosives.

A Bureau of Explosives educational moving picture film will be shown.

"The Oil Freight Rate Situation." Fayette B. Dow.

AFTERNOON

2:00 p. m. Group Meetings:

Group 1—General Topic: California Production Engineering Symposium. (Ballroom Foyer).

(Note—This is a joint session between the Standardization Division of the Institute and the Petroleum Division and the California Sections of the American Institute of Mining and Metallurgical Engineers. The program has been arranged by representatives of the latter named organization.)

"Deep Drilling Practices." R. H. Garrison, E. J. Miley Co.

"Improvement in Production Methods." (Speaker to be announced.)

Discussion:

"Economic Effect." (Leader to be announced.)

"Gas Lift." Led by R. P. McLaughlin.

"Influence of Submergence on the Efficiency of the Oil Well Plunger Pump." L. U. Uren, University of California, assisted by S. B. Sargent and V. J. Collins.

Group 2—General Topic: Special Products from Petroleum. (Conference Room 3).

"Experimental Studies in the Use of Petroleum Oils as Insecticides for Citrus and Deciduous Trees." E. R. deOng, University of California.

"Special Uses of Petroleum Products." J. B. Terry, Standard Oil Co. (California).

"Organic Chemicals From Still-Gases." (Speaker to be announced.)

Group 3—General Topic: Methods of Credits and Collections. (Conference Room 7).

"Extending Credit." F. H. Bowman, Pure Oil Co.

"Methods of Collection." K. R. Hankinson, Tide Water Oil Co.

"Functions of Credit Interchange Bureaus." E. B. Moran, National Association of Credit Men.

Group 4—General Topic: The Relations Between the Oil Industry and the Public. (Music Room).

"An Outsider Looks in at the Petroleum Industry." Judson C. Welliver, Public Relations Committee.

"Getting the Public to See the Industry as It Really Is." C. C. Herndon, Skelly Oil Co.

"Cooperative Work to Establish an Understanding With the Public." (Speaker to be announced.)

EVENING

8:00 p. m. Annual Dinner. (Ballroom).

There will be no speeches at the Annual Dinner. The program is being arranged by a special committee of Californians. Reservations for the Annual Dinner should be made promptly. The price is $6 per plate. The Program Committee regrets very much that on account of the limitations of seating capacity, attendance must of necessity be restricted to men only.

ENTERTAINMENT

▲ California Executive Committee on Reception and Entertainment is arranging a program of entertainment in connection with the Sixth Annual Meeting. Under its auspices:

An informal reception and smoker will be given at 8 o'clock, Monday evening, January 18, in the ballroom foyer of the Biltmore Hotel.

The Chamber of Mines and Oil will appoint a General Reception Committee.

A Ladies' Reception Committee has been appointed.

On Friday, January 22, beginning at 9:30 o'clock a. m., and ending about 4 o'clock p. m., visiting members will be given an automobile trip to the southern California oil fields. The route will be as follows:

Section A: Inglewood, El Segundo, Torrance, Watson, Long Beach (stop for luncheon), Signal Hill, Santa Fe Springs, thence via Northam to Coyote Hills property of Standard Oil Co., Montebello and return.

Section B: Montebello, thence via Whittier to Coyote Hills property of Standard Oil Co., thence via Northam to Santa Fe Springs, Signal Hill, Long Beach (stop for luncheon), Watson, Torrance, El Segundo, Inglewood and return.

A Golf Tournament will be held, under the direction of a special committee, on Friday, January 22. Transportation to the Golf Club and luncheon for the participants will be provided.

The committee is making arrangements for a dance in the ballroom of the Biltmore Hotel, 9 to 12 o'clock p. m., Friday, January 22.

LOS ANGELES READY TO GREET ITS GUESTS

(Continued from Page 29)

While the annual banquet is in progress the women at the convention, with their escorts, will be entertained at a big theater party at which they will witness a performance of the "Student Prince."

The committee on reception and entertainment is planning to have beautiful bouquets of flowers placed in the rooms of all delegates and guests at the Biltmore, Ambassador and Alexandria Hotels, which have been designated as convention headquarters, and in any other hotel rooms where delegates and their guests may be stopping. Favors will be in the form of small crates of California's famous Sunkist oranges. These will be given to all visitors, as souvenirs of the occasion.

Local Committees

Five working committees have been created to assist the executive committee in its convention arrangements. They are as follows:

Ladies' entertainment and reception: Chairman, Ward B. Blodgett; A. S. Guiberson, Joseph Jensen, J. E. Elliott, Walter P. Monroe and M. W. Wickersham.

Reception and dance: Chairman, Harry Maxwell; Allen Morphy, Martin Van Couvering, Arthur Wickersham, Ward Blodgett, J. E. Elliott, C. R. McCollom, W. S. Clute, Jack Sickler and Wendell M. Smith.

Badges and Symbols: Chairman, W. W. Copp, and J. E. Asher.

Transportation: Chairman, Neale C. Needham; W. S. Smith, J. S. Nolan, C. E. Sampson, S. E. Foster, E. M. Spear, Martin Van Couvering, Joseph Jensen and W. S. Clute.

Arrivals and information: Chairman, Harry A. Kassebaum; C. R. McCollom, Martin Van Couvering, W. W. Copp and Arthur Wickstram.

The Los Angeles Chamber of Mines and Oil has created a general reception committee consisting of 94 prominent members of the California oil industry. W. R. Guiberson is chairman. The other members are as follows:

Chester W. Brown, Phillip Wiseman, Harry J. Bauer, H. L. Westbrook, H. J. Barneson, Ward Blackburn, R. A. Broomfield, A. C. Dieriux, David S. Ewing, E. B. Gilmore, H. H. Hillman, Joseph Jensen, F. R. Kenney, M. E. Lombardi, A. B. Macbeth, C. C. Magenheimer.

Theodore Martin, E. J. Miley, W. C. McDuffie, A. C. McLaughlin, H. L. Payne, R. L. Peeler, F. C. Ripley, James A. Talbot, Waller Taylor, F. C. Van Deinse, A. L. Weil.

J. C. Anderson, J. E. Elliott, W. M. Keck, N. C. Needham, J. C. Axelson, C. M. Fuller, T. C. Kierluff, Thomas A. O'Donnell, R. E. Barry, Fred Feisthamel, O. D. Knight, H. W. Platenberg, Roy N. Bishop, F. E. Foster, Clifford Lord, A. J. Pollak, George Black, F. V. Gordon.

G. V. Martin, James Regan, W. G. Black, H. P. Grimm, A. C. Mattei, V. H. Rossetti, Ward Blodgett, Frank Hall, Harry Maxwell, C. C. Scharpenberg, C. F. Braun, F. F. Hill, C. R. McCollom, D. M. Smith, John E. Brennan, H. E. Hoffer, A. A. MacDonald, Wendell Smith.

L. F. Burgess, W. F. Huff, J. F. McMahon, R. A. Sperry, R. R. Bush, J. F. Jefferies, M. V. McQuigg, Morgan L. Sweeney, W. S. Clute, Joseph Jensen, M. M. Miles, Martin Van Couvering, W. W. Copp, A. T. Jerkins, L. H. Mitchell, Charles Wagner.

Joe Crail, C. A. Johnson, Alan E. Morphy, Kenneth Wallace, J. B. Dabney, E. M. Jones, M. H. Mosier, Arthur Wickstram, J. M. Davis, H. A. Kassebaum, Scott Nottingham, Charles T. Wilson, Birney Donnell and Ben Youngken.

REFINING AND MARKETING

MANAGER OF STATIONS OF UNION OIL COMPANY

E. S. Sharp, manager of stations, has spent over a quarter of a century in the oil business, 11 years of which has been in the service of Union Oil Co. of California. Born in Cincinnati, Ohio, he found his first position with the Standard Oil Co. in the sales department. Nine years later, he became associated with the Indian Refining Co. at Indianapolis as a salesman, and after one year, he was promoted to the position of assistant manager at that point. In another 12

E. S. Sharp
Manager of Stations, Union Oil Co.

months, he became manager of the northwest district which embraced Minnesota, Wisconsin, North and South Dakota, with headquarters at St. Paul.

This position he held until he came to the Union Oil Co. as special agent at Oakland in December, 1914. In March, 1918, he was transferred to the Los Angeles district, the largest in the system, as district sales manager. He was promoted to his present position one year ago. His duties include supervision of all properties and equipment of the sales department and all departmental matters, excepting those concerning actual sales.

CHICAGO DISTRIBUTORS ORGANIZING OIL CLUB

CHICAGO, Jan. 9. — There was a meeting of local oil men, chiefly from the distributors, at the Auditorium Hotel for the purpose of forming some sort of a permanent organization along the lines of the old Round Table Clube or possibly the Chicago Petroleum Corp. There were about 25 present, all active oil men. Considerable time was devoted to talking over various plans. The meeting was called by Charles S. Rosenthal, vice president and general manager of the Apex Motor Fuel Co. Mr. Rosenthal was made the permanent chairman. As the result of the discussion, the chairman was empowered to appoint a committee of five, with himself as chairman, to prepare a plan which will be taken up and approved after consideration at a meeting to be held at the Auditorium Hotel Thursday, January 14. Those appointed to the committee besides Chairman Rosenthal include George C. Peterson, of George C. Peterson & Co., jobbers, E. W. Miles, of Murphy-Miles Co., tank wagon distributors; Charles Gower, Sterling Refining Co., tank wagon distributors; and Walter Herr, assistant general sales manager of the Cosden Sales Corp.

SOUTH DAKOTA JOBBERS IN ANNUAL CONVENTION

SIOUX FALLS, S. Dak., Jan. 9.—Members of the South Dakota Independent Oil Jobbers' Association, at the close of their annual convention here, elected officers for the coming year and selected the shores of Enemy Swim Lake, a noted summer resort of South Dakota, as the place for their midsummer meeting.

J. H. Cumbow, of Sioux Falls, was re-elected president. Other officers named are: F. H. Buehler, of Madison, secretary; H. M. Crawford, of Vermillion, vice president; H. L. Freeman, Sioux Falls; M. R. Basker, Watertown; B. C. Regen, Aberdeen, and C. M. Miller, Yankton, directors.

The convention was regarded as very successful, the attendance exceeding the total membership of the association. The general sentiment of those present, and the general tenor of the addresses, was that gasoline dealers faced a prosperous year and were better prepared than ever to give their patrons the best of service.

The insurance committee announced that it has outlined plans for the reducing of the hazards in connection with the handling of oils and gasoline and the reduction of insurance premiums. Freight rates and their effect on the retail price of gasoline were the subject of the report of the freight rate committee. The result of the injunction terminating the State gasoline "war" and the part played by the association were pointed out by the injunction proceedings committee.

C. C. Wagner, of Madison, spoke on "Quantity Discount; Does It Pay." He told of the amount of money tied up in quantity shipments and compared the interest on this amount with the discount for the purchase.

The annual address of President J. H. Cumbow, of Sioux Falls, among other things, related in some detail what had been accomplished by the association during the past year in behalf of its members and independent gasoline dealers in general. During the year the association ironed out a number of things which under the new arrangement will prove beneficial to all gasoline dealers. He stated that the association had at all times been vigilant and ready to protect the interests of its members, and that the same policy would prevail during the coming year.

One of the interesting addresses of the convention, which appeared to strike a keynote so far as the assembled dealers was concerned, was made by Carl Berdahl, of Sioux Falls. A great part of his remarks had to do with the matter of refineries selling gasoline to what regular dealers term "bootleg" dealers, those who have no regularly established business with a large investment such as regular dealers are forced to maintain in order to take care of their trade.

He argued that gasoline should not be sold to irresponsible dealers of the "bootleg" class, whose competition is unfair to regular dealers, and that in the gasoline business the same policy should be followed as is in effect with reference to wholesale clothing houses, farm equipment manufacturers and other lines, who through the efforts of dealers' associations now quite generally refuse to sell their goods to so-called retailers—curbstone "operators," as it were—who are not regularly established and who do not pretend to make their business of a permanent character, merely intending to skim off the cream, to the injury of regular retailers with their costly plants and other investments, and then swing to some other line of business in which they may see a temporary profit.

In the evening of the first day of the convention the delegates were guests at a banquet, at which Mr. Berdahl, of Sioux Falls, acted as toastmaster. There were a number of short addresses. At one of the sessions of the convention the delegates were deeply interested in a full presentation of the national advertising program by Ray Shaw, advertising director of the N.P.M.A., of Chicago.

N. P. M. A. SPRING SESSION

The Spring Conference and Convention of the National Petroleum Marketers' Association will be held at the Congress Hotel, Chicago, April 6, 7 and 8, according to an announcement of the past week from the association's headquarters.

"No further announcement can be made at this time except to state that the three days will be devoted to our usual open forum discussions on matters of outstanding industrial interest and importance," according to L. V. Nicholas, president of the association. "The keynote of the gathering will be a study of sales building ideas and ideals. In other words, it will be a spring gathering to put punch and profits into the oil business for 1926."

GASOLINE TAX TEST BEGUN IN MONTANA

HELENA, Mont., Jan. 11.—While the Montana State Board of Equalization and the Attorney General are renewing attempts to procure payment of delinquent gasoline taxes totaling more than $101,000 for the first quarter of 1925 from 11 refiners, the Hart Refineries at Missoula has filed suit in District Court asking return of $6,071.84, which has been paid the State Treasurer in taxes.

The Hart Co. alleges that the 2 cents tax on gasoline is discriminating and that the State law providing for this tax is unconstitutional. The suit charges that a refinery at Spokane, Wash., is exempt from the tax on its gasoline sold in Montana and therefore is able to and does undersell the plaintiff's product 2 cents a gallon.

O'NEIL CO. DIVISIONS

The O'Neil Oil & Paint Co. of Milwaukee is now changed into three separate corporations, the O'Neil Oil Co., which takes over the extensive oil business of the organization; the O'Neil Products Co., which takes the business of jobbing of painters' supplies, and the O'Neil Duco Co., which will continue the paint and varnish manufacturing business. The business was founded 33 years ago by George F. O'Neil, which will remain at the head of the companies in a supervisory capacity.

GASOLINE PRICE SUIT

MURFREESBORO, Tenn., Jan. 11.—Seeking an injunction against seven large marketing companies selling gasoline in Tennessee at the same price retail as wholesale, 25 independent dealers have filed a bill in Chancery Court. The defendants include the Standard Oil Co. of Louisiana, the Sinclair Refining Co., The Texas Co., the Gulf Refining Co., the Pan American Petroleum Co., the Mexican Petroleum Co. of Louisiana and the Producers & Refiners Corp. of Tennessee.

ALBERTA GASOLINE TAX

CHATHAM, Ont., Jan. 11.—Gasoline tax receipts for the Province of Alberta amounted to $308,000 during 1925, an increase of $14,000 over figures of 1924. Automobile licenses yielded the province $955,000 during the year.

TO OVERSEE REFINERY SOURCES OF N.P.M.A.

Weston Atwood, formerly vice president and general manager of the DeLeon Refining Co. at DeLeon, Tex., has joined the executive staff of the National Petroleum Marketers' Association. Mr. Atwood will have general supervisory charge of the association's relations and activities in connection with the refinery

Weston Atwood

sources of supply of the independent jobbing interests belonging to the association.

Mr. Atwood has had considerable experience both in refining and marketing. In association work he has been vice president of the Texas Independent Oil Jobbers' association and a director of the Western Petroleum Refiners' Association.

LESS FUEL OIL USED BY UTILITY PLANTS

Daily average consumption of fuel oil by electric public utility power plants in the United States during November amounted to 787,421 bbls., or a daily average of 26,200 bbls., according to figures compiled by the Division of Power Research of the United States Geological Survey.

This was a decrease of 46,107 bbls. from October, or a daily average reduction of 200 bbls. While this decrease was less than 1 per cent. the reduction in the use of coal amounted to more than 3 per cent and natural gas 4.6 per cent.

Comparing fuels used by power plants in November, 1925, and November, 1924, the trend was apparently toward coal as the use of coal showed an increase of 5 per cent in November, this year, as compared with the same month last year, while oil as a fuel declined more than 3 per cent. A decrease of more than 8 per cent was shown in the use of natural gas.

The survey's figures showed that the total consumption of coal during November was 3,476,600 tons, fuel oil 787,421 bbls. and natural gas 4,237,716,000 feet.

MICHIGAN GASOLINE TAX

DETROIT, Mich., Jan 11.—More than $7,500,000 was collected in Michigan from the 2-cent gasoline tax during the first 11 months, according to a report just issued by State officials. This amount was $1,500,000 more than was expected. November receipts were $726,508.

JENKINS CRACKING PROCESS

PRODUCES QUALITY GASOLINE

Facts from performance

The growing favor being accorded the Jenkins Cracking Process is due to the fact that *on-the-ground* investigations substantiate the claims made for it.

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Write any office for descriptive bulletin

It is the Middle-Man Who Stabilizes Business

Probably, when most people enter a drug store for face powder—shaving soap—or a package of cigarettes, they have little thought as to how this assortment of merchandise ever happened to find its way to that particular drug store.

Or, if they do have any thought, it is a vague one that some place there is a cosmetic manufacturer—a soap-maker—and a tobacco grower who originated the merchandise.

But there is one factor that few people have any thought about. The drug store may be located in California—the cosmetic manufacturer in New York—the tobacco grower in Virginia—and the soap-maker in Michigan—even Paris, France. In addition, there is the fact that the average druggist probably carries a thousand or more other items of merchandise, coming from a thousand or more manufacturers.

Obviously, the druggist cannot take the time to order separately from all of these. And even if he did, he would have to contend with varying shipping conditions.

And think of the manufacturer. There are probably more than one hundred thousand druggists in the country. It certainly would be expensive to employ salesmen to call on them all. It would be hopeless to try and fill their individual orders economically and efficiently, even with an excellent shipping department.

Yet, the manufacturers must have the druggists' business in order to live—and the druggists must have the manufacturers' wares in order to do business.

Filling this gap between is the jobber—in a sense, the middle-man.

He buys in large quantities from a number of manufacturers—saves them money.

In turn, he acts as warehouse for the dealers—as one central source of supply.

The face powder, the soap and the cigarettes are all bought by the dealer from one jobber.

The same condition is true in the oil business. The retailer, selling various kinds and grades of oil, orders from the jobber. A refinery, instead of attempting to do business with countless retail outlets, sells to a comparatively few jobbers. In this manner both realize a tremendous overhead saving and freedom from complications.

You—in the oil business—can do the same by getting in touch with the Acme Petroleum Company.

(This is the forty-fifth of informatory advertisements on the distribution problems with which the oil industry has to contend.)

ACME

Petroleum Company

Executive Offices: 624 S. Michigan Ave., Chicago

KANSAS CITY, MO. Land Bank Bldg.

DALLAS, TEXAS Magnolia Bldg.

OIL STORAGE PLANTS

Over 7,000,000 Gallons Storage

West Tulsa, Okla. Riverdale, Ill.

(Chicago Switching District)

ADVANCE IN TANK WAGON MARKET EXPECTED IN CHICAGO TERRITORY

By J. B. Waldo

CHICAGO, Jan. 9.—Chicago sellers of petroleum products are keenly interested in the outlook for an enlarged business. Some say December was a worse month than November and so far January has been worst of all, but they are optimistic and say with reason that it is still early and that January of last year began with a good business which increased as the month progressed.

The trade wonders if the price range is to parallel—only on a higher range—that of the past two years. The trade figures out that between the beginning of January and the middle of February in these years the spot market advanced about 4 cents from the low point at the opening of the year. If the gasoline market is to make a like advance this year it will mean a 14-cent refinery price before the end of the next month. The result of these past rapid advances was an increase of output, a falling off of jobbers and of export buying and the opening of the flood gates to California gasoline and crude and from the best to the least informed, the query is asked will it happen again? Generally there is a belief that somewhat higher prices should prevail, but they do not want to see prices advanced to the point where the same conditions will prevail as a year ago and two years ago, and the market strike the slides just when the demand is at its height. So the feeling is let us be careful, all of us.

Little Real Demand

There has been little real demand for gasoline. There has been very little, if any, of the 56-58-450 gravity sold. It is too cold, and not much of the higher gravities, it is not cold enough. Navy is good enough for those who want gasoline. Prices are practically pegged for U. S. Motors at 10 cents. The cheap gasoline that was available in small quantities at the end of December has disappeared and some sellers, both refiners and marketers, have tried to get better prices than 10 cents for U. S. Motors gasoline, but their success has been small. There is some gasoline bought for late December or early January shipment at prices ranging from 9½ to 9¾ cents that is occasionally sold in car lots at 9⅞ cents, maybe an occasional car could be had under distress circumstances at 9¾ cents right now, but there is very little going at any other price than 10 cents and has not been for a week. The market was beginning to seem a bit soft when reports came to hand of large export buying in Tulsa and of advances by refiners. In one case a buyer for export was so explicitly slated to be purchasing in the Tulsa market that the management of the Tulsa office telephoned to this city to know if purchases were being made there without letting the Tulsa office know about it. Two concerns were reported to have options on considerable quantities of motors gasoline which they expected to exercise when the time came, but the total of the two was not equal to the reported purchases of either the Sinclair or the Carson organizations.

Kerosene Firm

Kerosene is firm at higher prices. The market is strong. Jobbers who filled their tanks last November and early in December are proud of their foresight and ability as merchandisers. There has been a good demand both for domestic consumption and for export and the output has been considerably less so that some see a 6-cent price for 41-43 gravity as a possibility without a crude advance. Refiners are asking 5½ cents and that is the bottom price today for regular business although it might be possible to pick up a little here and there from refiners for immediate orders at 5⅜ cents, but the delivery might be delayed. In fact, the deliveries right now are slow from any of the refiners.

Furnace Oils Disappoint

The demand for furnace oils has been disappointing so far this month. During the cold spell around Christmas there was a regular scramble for distillate and gas oil, but the demand for the former is light now. Gas oil is becoming a very important factor in the furnace oil business. It is delivered to the users of the higher gravities of fuel oils either plain or in blends with Smackover. Attention was called to the trouble that some are having with their oil this season as it gummed the burner, something that the oil used in the same plant last year did not do. The users believe they are getting a blend this year against straight gas oil last year and are investigating. There is some 35-37 distillate selling in a small way, but this might grade as 36-38 were it not for freight classifications. There is a little demand for 40-42 gravity, but there is no real activity and some of the local tank wagon firms have cars they could spare.

Gas Oil Strong

Gas oil is active and strong, dividing the honors with kerosene. The larger demand is for furnace oils where it is supplanting the lighter gravities, such as the 28-30 or 32 grades and in some cases the heavier distillates. The combined demand from the gas companies and the distributors is caring for supplies and offerings for early delivery are light. The only industrial demand seems to be an occasional car for blending, in many cases being added to a heavy oil to make it work better. The market is firm at 3¾ to 3⅞ cents with an occasional sale at 4 cents as a premium for prompt delivery.

Fuel Oils Slow

Fuel oils continue to move slowly and while there are a number of inquiries for contracts from industrial concerns and several railroads have contracts to be renewed, little progress is being made. Buyers want lower prices. Still some contracts are being signed, although not of the larger kind. Some buyers are securing quotations direct from refiners at prices as low as the refiners' prices to the marketers of fuel oils. These seem attractive, or more attractive, than the market prices, but the dealers say if the refiners do not do better by the buyer than they do with the marketer in deliveries the users will have a lot of trouble.

Lubs Little Changed

Lubricating oils have shown very little change and little real business is reported. Jobbers' and distributors' sales generally are light in motor oils and fairly good in lubricating oils. One trouble is there are so many in the business. The report of large profits has lured many into the lubricating business with little knowledge of its ins and outs and the paper profits have dwindled as the unexpected costs of doing business are developed.

Dislike Discount

The tank wagon situation in Chicago is complicated by a desire to do away with the 1 cent discount allowed locally on dumps of 100 gallons. Apparently every distributor would like to abolish this discount, but it requires united action and it seems impossible to secure united action on this question. One distributor took the initiative and did away with the discount only to find his competitors had not. Then the management of another large concern being, as he claims, assured that if his company would abolish the discount all the rest would follow, issued the order to desist and much to his disgust found he was in a class all by himself so he is now on record that when everybody else is up then he follows and not until then. The Standard Oil Co. is understood to be entirely agreeable to the change, but does not want to act until the others have taken the step and the latter say

it would be fine business for them to line up at the higher price and then let the Standard have the pickings for three or four days to show their good faith. But the desire to do away with this discount is so general something may be done very shortly.

Situation Improved

Generally over the territory the situation is much improved and there are very few spots, only one of real importance, where the market is not substantially normal. With this condition it is felt that if the refinery markets hold firm and more especially if they advance, the tank wagon markets must be increased and it is better judgment to mark up the prices to consumers while the snow is on the ground and the number of cars in actual service is reduced to a minimum. On the basis of present refinery prices to the trade gasoline costs, freight paid to Chicago, 12.28 cents. The discount price in dumps of 100 gallons is 15 cents and the tank wagon prices in deliveries of 99 gallons or less is 16 cents. If any jobber can make money on these prices he is able to operate on very moderate costs. The integrated company which distributes its own gasoline may be able to show a profit somewhere, but not on both refining and distributing.

CONTINUED FIRMNESS IN THE EAST PRINCIPAL CHANGES IN FUEL OIL

By N. O. Fanning

NEW YORK, Jan. 9—Continued firmness was the rule in the eastern refined oil market situation during the past week. Principal changes in prices occurred only in fuel oil, bunker fuel oil having been advanced 10 cents a barrel at New York to $1.75 (lighterage 6½ cents a barrel extra), and Diesel oil 10 cents to $2.20 a barrel.

Gas oil was advanced ¼ cent to 5½ cents in tank car lots f.o.b. refinery.

The gasoline tank wagon market remained without important change, either as to prices or as to the tone of the market, which is firm. There is no apparent price cutting of far-reaching extent in any part of the eastern territory. On the other hand, consumption is good and service stations are not having to press sales through lowering prices.

There had been expectations of a severe winter and many marketers, jobbers and refiners had been hesitant in buying in late fall or in producing gasoline. The result is that the condition of the market at the present time is stronger than it otherwise would have been. Gasoline supplies are in strong hands and stocks are not piling up at too fast a rate, due to the improvement in consumption.

One larger refiner in this district advanced its price on spot gasoline and is now quoting U. S. Motor at 12½, but whether it is willing to dispose of any great amount at that price or not is another matter. The belief is that there is practically no spot gasoline to speak of at local refineries.

Tank Car Market

The gasoline tank car market is firm, with offerings limited. Some Pennsylvania gasoline is finding its way to the New York and New England territory, but is being held for 13½ cents, according to reports. There is little Mid-Continent gasoline on the market in tank car lots. Some of the biggest marketers of this grade in recent months have practically withdrawn entirely, as they have not a sufficient surplus of gasoline over their own retailing requirements.

Marketers Cautious

While the general situation is favorable, there is no disposition to become overenthusiastic about the outlook for oil prices, especially gasoline. Shrewd students of the market realize that the present strength is due largely to a conservative price policy, and believe that any advance, however small, would increase the production in a surprisingly short time. So long as the productive capacity of the oil industry is in excess of the consumptive capacity, leading oil men insist upon caution. Through increased crude runs and use of available cracking capacity or capacity now under construction, it is believed by many that the supply of gasoline could be made to much more than meet requirements, even of next summer, notwithstanding a possible balance at present.

For these reasons the possibilities of an advance in the gasoline tank wagon market are not great for the immediate future

That the crude oil situation will have much to do with the price trend is evident. Therefore, a continued drop in production with a consequent increase in crude prices might bring higher gasoline quotations at a more early date than now seems reasonable. to expect.

Kerosene Firm

The kerosene market continues firm, with the situation about as outlined in recent letters. Outside influences are serving to keep domestic kerosene quotations up, and these influences have not undergone any important change.

Gas and Fuel Higher

Both fuel oil and gas oil were marked up during the week, in accordance with expectations in the trade. The higher prices are looked upon as a criterion of general strength in the oil markets, for there is no indication that the supply of fuel oil will be more ample in the near future than at present. Eastern marketers are drawing principally on the California fields, Mexico and Smackover for fuel oil, with the supply at the latter point believed to be at a pretty low level. Increased takings of California oil are probably for that reason, and Mexican receipts have also been increasing.

Local fuel oil marketers in touch with the Gulf Coast fuel oil situation say prices are tending to advance there, with little fuel oil in large lots available at the reported quotation of $1.45 a barrel. They say that $1.55 is being offered, but there is little spot fuel oil available even at that figure. No doubt the eastern market will advance in sympathy with the Gulf market, and higher prices may be expected.

Lubricating Oils Firm

The lubricating oil market is showing a better tone. Prices continue unchanged at local refineries. Lubricants are moving more briskly into industrial channels, with the motor demand also unusually good. Demand for red and pale oils is showing particularly strong improvement, with pressure from Gulf Coast marketers somewhat removed.

Paraffin Wax

The market for paraffin wax is unchanged, with prices firm. Demand for higher melting points is especially noted.

Petrolatum Higher

The first distinct improvement in the local petrolatum market can be reported. Price of amber is up about ¼ cent to 3⅝ cents a pound in carload lots. Light amber is somewhat higher, now bringing 3⅞ cents a pound. Other grades are still unchanged, although enjoying a somewhat better demand. Factors in the petrolatum market believed present improvements will be sustained.

Export Market

One feature of the oil export market here during the week was an improvement in demand from European distributors with the result that, according to the understanding, several bulk cargoes have been arranged for gasoline, kerosene and lubricants for next month

During the past week three bulk export consignments left for Europe One cargo consisted of 1,185,578 gallons of gasoline, and 553,109 gallons of kerosene destined for France. The Benjamin Brewster sailed for Germany with 1,790,412 gallons of lubricating oils, a cargo which consisted largely of red and pale oils. A cargo of gasoline and kerosene left for England, consisting of 2,104,568 gallons of gasoline and 1,030,256 gallons of kerosene.

The following table shows principal exports of petroleum and petroleum products from New York during the last three weeks (figures in gallons unless otherwise noted in parentheses):

	Week Ended		
	Jan. 6	Dec. 30	Dec. 23
Gasoline:			
Bulk	3,290,146	.....	2,115,972
Cases	821,760	721,333	2,918,060
Kerosene:			
Bulk	1,583,365	.....	3,512,048
Cases	234,830	464,440	5,133,380
Turpentine substitute:			
Cases	.....	76,500	136,233
Lubricating oil:			
Bulk	1,790,412	.....	.....
Barrels	1,146,350	996,050	2,646,400
Cases	.....	19,930	411,790
Lubricating grease:			
Barrels (lbs.)	292,500	141,660	1,306,800
Paraffin wax:			
Bags (lbs.)	964,480	1,923,020	3,699,080
Petroleum asphalt:			
Barrels (lbs.)	.....	1,298,000	.....
Petroleum coke:			
Bags (lbs.)	.....	2,167,000*	.....
Crude oil:			
Barrels	.....	.....	43,800

*Revised.

The above figures include exports in lots of 500 bbls., 1,000 cases, or more.

Tanker Market

Business in the oil tanker chartering market continues at a low ebb. Expected improvement following the holidays has failed to appear, nor is there any indication of it in the near future. Although more vessels are now employed than a few months ago, especially in the intercoastal movement, affecting only tankers under American registry, there are still plenty of idle tankers available for both intercoastal and export cargoes, according to authorities on the charter market.

Oil Receipts Gain

Estimated daily average receipts of crude and refined oil at Atlantic Coast ports during the week ended January 6 amounted to 538,000 bbls., compared with 385,000 bbls. the week ended December 30. An increase in receipts from the Gulf and Pacific Coasts of the United States, and in imports, took place.

The December receipts of crude and refined oil by water at Atlantic ports amounted to 14,111,000 bbls., a daily average of 456,000 bbls., a gain of 69,000 bbls. over the daily average for November. Comparison of December and November daily average receipts follows:

(Barrels)	Dec.	Nov.
Gulf Coast	298,000	259,000
Pacific Coast	53,000	36,000
Imports	105,000	92,000
Total	456,000	387,000

Improvement was noted in all departments, with an increase of 39,000 bbls. in daily receipts from the Gulf, 17,000 in California receipts and of 13,000 bbls. in imports.

The year 1926 has started out with comparatively heavy California receipts, which, however, may diminish at the end of the year.

The following table shows estimated daily average receipts of crude and refined oil by water at Atlantic Coast ports from the Gulf and Pacific Coasts of the United States, and imports, for the last three weeks; also monthly record for the last 12 months (figures in barrels):

	Week Ended		
	Jan. 6	Dec. 30	Dec. 23
Gulf Coast	314,000	258,000	280,000
Pacific Coast	95,000	47,000	17,000
Imports	129,000	80,000	102,000
Total	538,000	385,000	399,000

Daily Averages by Months

1925—	Gulf	Pacific	Imports	Total
December	298,000	53,000	105,000	456,000
November	259,000	36,000	92,000	387,000
October	249,000	36,000	102,000	387,000
September	306,000	66,000	76,000	448,000
August	291,000	54,000	90,000	435,000
July	391,000	63,000	107,000	561,000
June	379,000	66,000	118,000	563,000
May	312,000	81,000	145,000	538,000
April	353,000	78,000	101,000	532,050
March	273,000	82,000	135,000	490,000
February	262,000	51,000	147,000	460,000
January	311,000	77,000	133,000	521,000

The foregoing estimates are based upon the carrying capacity of incoming oil-laden tankers.

ROCKY MOUNTAIN AREA

(Continued from Page 56)

Midwest has plugged the Parkinson well on Section 22-4-92 and will abandon. This well found production in a shale lens and made 200 bbls., then water appeared and the water gradually increased as the oil decreased, until the hole was making almost all water. The well was drilled to 2,726 feet.

Third Pay in Artesia

The Ohio Oil Co. has discovered the third pay sand in the Artesia Field in New Mexico on the Toomey Allen lease on Section 28-18-28, at 2,717 feet. This sand has long been thought to underlie the other pay sands at Artesia because of the outcrops at the mountain bases miles away, but the Ohio was the first company to drill a producer in the new sand. The Texas Co. also found a producer in this sand in the north end of the field and the sand is therefore considered uniform over the area. The Ohio well is to be continued on down to the Delaware sand which is expected about 3,700 feet.

Weather Shuts Down Wildcat

The recent stormy weather in central Wyoming has shut down practically all the wildcats in the Casper district. The Midwest well at Powder River is still drilling and the Marland is working at Wilson Dome, but for the rest, the work has been stopped until better weather prevails.

Salt Creek producers, a subsidiary holding company of the Midwest Refining Co. has announced a dividend of 2 per cent payable to stockholders February 1, also an extra dividend of 4½ per cent and an extra dividend of 10 per cent. The total amounts to about $1 per share and will take $2,400,000 out of the firm's treasury.

The Gose oil Syndicate's well on Section 28-47-65, in the northeast corner of Wyoming is shut down at 4,800 feet and the showing of oil reported in the well did not materialize into commercial production. This is one of the deepest holes ever drilled in that part of Wyoming and is now considered a dry hole by the oil men who have been watching the well. The well was financed by a rancher of that region who pinned his faith on there being a great field there.

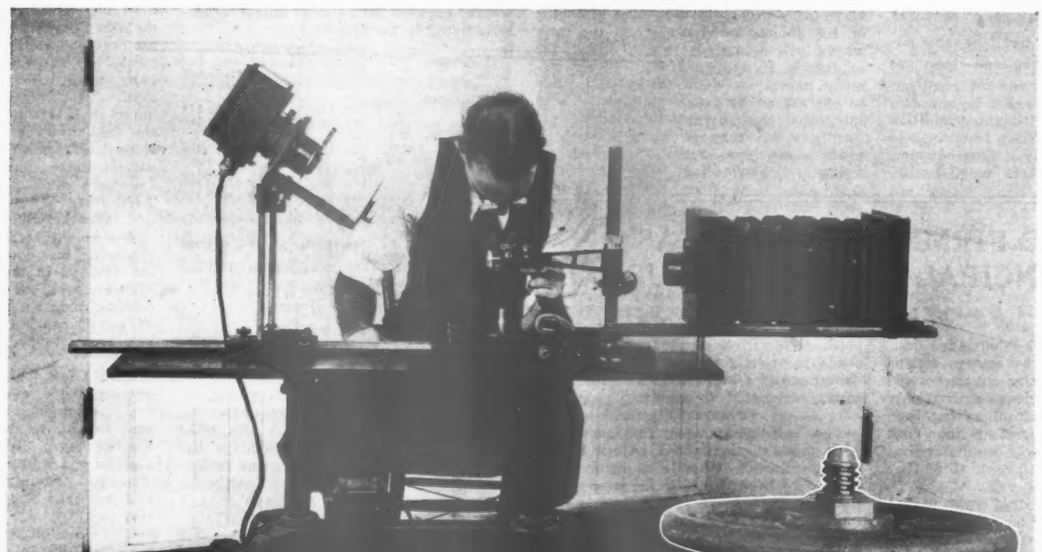
The striking of new production at Lance Creek, in Niobrara County, Wyoming, by the Ohio Oil Co. has awakened new interest in that field. From the way the new wells have come in, it would seem that Lance Creek resembles some of the Oklahoma fields where the sands lie in lenses and wells within a short distance of each other would find production at different depths and in different layers of sand. The Sinclair interests have secured a lease in the central part of the field and it is expected that the Mammoth Oil Co. will devote its attention to other fields than Teapot the coming summer unless the courts render a decision in the Teapot case and permit operations to be carried on there again.

Field Runs for the Week

	Barrels
Salt Creek	62,440
Teapot	1,890
Big Muddy	3,330
Grass Creek	2,860
Elk Basin	610
Greybull	25
Rock River	2,950
Lance Creek	2,430
Poison Spider	390
Osage	270
Hamilton Dome	1,160
Lander	260
Byron	30
Pilot Butte	30
Lost Soldier	4,040
Ferris	40
Cat Creek	3,160
Sunburst	7,850
Lake Basin	120
Iles Dome	140
Florence	400
Moffat	3,202
Ft. Collins	2,075
Boulder	25
Rangeley	100
Tow Creek	113
Hogback	510
Artesia	3,800
Miscellaneous	110
Total	104,369

SWISS OIL CORP. BUYS UNION GAS & OIL CO.

INDIANAPOLIS, Jan. 9.—A $5,000,000 deal was closed here whereby the Swiss Oil Corp., controlled by Lexington, Ky., and Chicago financiers, obtained the property of the Union Gas & Oil Co., controlled by Arthur B. Ayers of Fortville, Ind., Frank M. Milliken, Indianapolis, and A. C. Albion of Newman, Ill. The Union Co. property consists of more than 500 producing oil wells in eastern Kentucky.



Investigating the Macro-Structure of the Steel for

HUGHES VALVES

By Means of The Binocular Microscope

HUGHES TOOL COMPANY

Branch Plants
Los Angeles, Calif.
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MAIN OFFICE AND PLANT
HOUSTON, TEXAS

Export Office
New York City, N.Y.

Brief Items for Plant Operators

CARBON BLACK PRESS USED IN BRIQUETTING

Invitations are being extended to members of the American Petroleum Institute to visit a series of demonstrations to be given at the Fernholtz Machinery Co.'s plant in Los Angeles. The reclamation of oil-coke residue in refineries has commanded the attention of engineers for many years, but because of the absence of machinery that would handle this by-product on a commercial basis it has developed slowly.

The Fernholtz Machinery Co. has produced a new type of press particularly adapted for handling this by-product. For many years numerous by-products have been briquetted and special machinery has been found to be eminently satisfactory in the briquetting of carbon black, a carbonaceous oily residue of California gas plants where illuminating gas is manufactured from petroleum. Briquetting has been used more or less for the reclamation of sawdust, sugar cane, etc., but it has been used very little in the treatment of oil-coke residue.

The problem of successfully commercializing the increased volume of coke residue created by the many highly perfected cracking processes has centered the attention of engineers upon the various briquetting processes. The result has been that numerous oil refineries are adopting the Fernholtz press and process, it is stated, and are now converting a heretofore waste product into a most substantial and profitable by-product. An idea of the great waste now existing in refining practice is revealed by the fact that less than 25 per cent of the oil-coke is merchantable, but by briquetting practically all of this can be reclaimed and converted into a valuable by-product.

NATURAL GASOLINE-A.P.I. JOINT SESSION

The program for the joint session of the American Petroleum Institute and the Association of Natural Gasoline Manufacturers to be held at Los Angeles January 20 was announced the past week by A. V. Bourque, secretary of the association.

The program as planned includes addresses on "Natural Gasoline—Its Present Position and Future Outlook," by E. L. Peck, general manager of the Empire Gasoline Co., Bartlesville, Okla., and president of the association; "What is Good Natural Gasoline From the Standpoint of the Refiner," C. J. Von Bibra, president of the Export Refining Co., Los Angeles; and "Methods of Manufacture—Present and Future," F. E. Rice, superintendent of the gasoline division of the Phillips Petroleum Co., Bartlesville.

Harry J. Bauer, president of the Pacific Gasoline Co., Los Angeles, will be chairman of the meeting while A. M. Ballard, district manager of the Sun Oil Co., Tulsa; R. E. Bering, president of the California Gasoline Corp., Los Angeles, and S. B. Mosher, president of the Signal Gasoline Co., Los Angeles, will lead discussions following the addresses.

LOUISIANA REFINING BUYS BEACON OIL CO.

Louisiana Oil Refining Co. is acquiring, through stock purchase, the Beacon Oil Co. of Boston, Mass., it has been announced by Richard B. Kahle, president, who pointed out that the new connection will afford the Louisiana company an outlet for a surplus of crude and petroleum products.

The Beacon Oil Co. holdings include a refinery and asphalt plant at Everett, Mass., with a capacity of 20,000 bbls. of crude daily. The Louisiana Oil Refining Co. at present has a 12,000-bbl. complete plant at Bossier City, La.

TEXAS PACIFIC COAL AND OIL CO. STARTS REBUILDING PLANT

Texas Pacific Coal & Oil Co. has a crew of about 100 men working on the remodeling and expansion of the old Montrose refining plant at Fort Worth, which the company purchased a short time ago. The new owner of the plant is spending between $400,000 and $500,000 on the property, converting it into a complete lubricating plant and making it one of the most up-to-date refineries in the Mid-Continent country. The plant originally operated as a skimming plant.

Complete Sharples equipment is being installed and the contact filter system will be employed also. Most of this equipment is now on the property and installation work is being rushed as rapidly as possible. It is expected the plant will be ready for operation about March 15.

The boiler system is being enlarged by the addition of two new boilers. A new machine shop is being put in, together with a large structural steel building for the Sharples equipment. A warehouse is also being built and a complete laboratory is being added. New tanks, one Foster pipe still, an agitator and full electrical equipment is also being added. A 50-car loading rack will be erected.

The Texas Pacific Coal & Oil Co. is laying its own gathering system of pipe lines in the oil fields in West Central Texas. The company already has a large tank farm at Ranger where the crude will be concentrated for transportation to the Fort Worth refinery. The company's average daily production in Stephens County, the Ranger Field and the Pioneer Pool will aggregate close to 2,500 bbls. It expects to run about this amount through its Fort Worth plant.

Remodeling and expansion of the plant is being done under the direct supervision of Dr. E. R. Lederer, vice president of the company in charge of refineries and gasoline plants. The company has two gasoline plants, one near Caddo in Stephens County, and the other at Mingus in Palo Pinto County. The company has another refinery in operation at Wynnewood, Okla.

LUCAS CO. TAKES OVER GRAND PRAIRIE PLANT

The Lucas Oil & Refining Co. recently chartered under the laws of Texas with a capitalization of $500,000, has taken over the old State Refining Co. skimming plant at Grand Prairie in Dallas County. The new owners are remodeling the plant and expect to have it in operation by February 1. The plant which will have a daily capacity of about 2,400 bbls. of crude, has been shut down for three years.

The company is also opening up a string of retail filling stations in Dallas and during 1926 expects to open stations in several other north Texas cities. The company already has three stations in Dallas and expects to open altogether 12 or 15 such stations in that city. Headquarters of the company are in the Republic National Bank building at Dallas. B. C. Lucas is president.

PLAN CRACKING UNITS FOR CHAMPLIN REFINERY

Decision to install cracking units at its Enid, Okla., refinery is seen in the announcement of the $2,000,000 bond issue of the Champlin Refining Co. The Continental & Commercial Trust & Savings Bank of Chicago, which is handling the sale of the bonds, stated in its announcement that the "proceeds of this issue will furnish the company with increased working capital and allow for plant expansion. The additional plant facilities should result in increased profits on the same volume of business through the recovery of a larger percentage of the higher priced petroleum products."

The company's plant at Enid is the third largest in Oklahoma with an approximate daily capacity of 16,000 bbls. It is the largest plant in the Mid-Continent area without cracking facilities. The company's properties are valued at $4,000,000 by engineers who appraised the properties for the bond issue.

AMONG THE TECHNICAL MEN

Fred C. Smith, veteran plant operator of the Southwest, was born into the oil business. For three generations the family has been connected with some phase of the petroleum industry. Mr. Smith's grandfather—Frederick Crocker—being one of the earliest drillers and operators in the Bradford, Pa., Field.

Fred C. Smith

Mr. Smith was born at Jamestown, N. Y., in 1873 and his early experience in producing and refining was in the eastern fields. Moving to the Southwest, he first had charge of the refinery of the Corsicana Petroleum Co. at Corsicana, Tex. Later he was for several years general superintendent of the Port Arthur, Tex., refinery of The Texas Co.

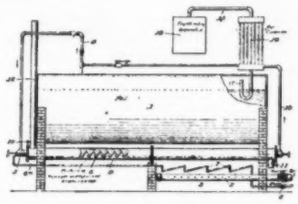
In 1920, he was made president of the Galena Signal Oil Co. of Texas. He had charge of the construction of the company's refinery located on the Houston, Tex., ship channel, now one of the most complete plants of the Gulf Coast area. Due to a serious injury, Mr. Smith was compelled to retire in 1923 from active management of that company.

Following his recovery, Mr. Smith took over the management of the refining department of the Houston Oil Co. of Texas, the position he now holds. Under his direction the company built its Camden, Ark., refinery, described in a recent issue of The Oil and Gas Journal.

Mr. Smith is the inventor of considerable equipment now widely used in the refining industry, including the Ready Roofing Machine and an oil can filling machine.

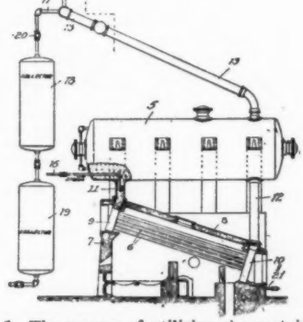
Recent Patents

1,567,212. APPARATUS FOR TREATING HYDROCARBONS. Frank C. Vande Water and Frederick R. Sunderman, Newburgh, N. Y., assignors to Petroleum Laboratories, Inc., Newburgh, N. Y., a Corporation of New York. Filed May 17, 1923. Serial No. 639,581. 1 Claim. (Cl. 196—61.)



In combination, a still, a vapor outlet therefrom, a cracking tube receiving vapors from the still and located beneath the still, a protective element completely surrounding the cracking tube and spaced therefrom, common means to heat the protective element and the still, and means to cause a current of cool air to circulate entirely around the cracking tube and between the cracking tube and the protective element.

1,566,828. Art of Distilling Petroleum Oils. Edgar M. Clark, New York, N. Y., assignor to Standard Development Co., a corporation of Delaware. Filed April 24, 1920. Serial No. 376,252. Three claims. (Cl. 196-84.)



1. The process of utilizing the contained heat of a fire heated still and setting at the end of a pressure distillation of a heavy oil for the production of gasoline for the treatment of the residues of the distillation, said residues being of about 20 degrees Be. density, which consists in withdrawing the still fire, subsequently passing steam through the residues and condensing the evolved vapors until about 60 per cent of the oil of the residues have been removed and condensed, and withdrawing the residual oil from the still.

REFINERY AND CRUDE PRICES

Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields

GASOLINE AND NAPHTHA

	Jan. 12		Jan. 5		Dec. 29	
OKLAHOMA (Group 3)—						
50-52 450 end point	.09	.09¼	.09	.09¼	.09	
56-58 450 end point	.09½	.09⅝	.09½	.09⅝	.09¼	.09½
58-60 437 end point (U. S. Motor)	.10		.10		.09½	.09¾
60-62 400 end point	.11⅜	.11½	.11¼	.11½	.11	.11¼
64-66 375 end point	.12¼	.12½	.12¼	.12½	.12	.12¼
68-70 350 end point	.13¼	.13½	.13¼	.13½	.13¼	.13½
KANSAS—						
58-60 437 end point (U. S. Motor)	.10¼	.10½	.10¼	.10½	.10	.10¼
NORTH TEXAS—						
48-52 450 end point (Naphtha)	.09		.09		.08½	.08¾
50-52 440 end point (Naphtha)	.09	.09⅛	.09	.09¼	.08⅝	.08⅞
56-58 450 end point	.09½		.09½		.09	.09¼
58-60 437 end point (U. S. Motor)	.09⅞	.10	.09⅞	.10	.09½	.09⅝
60-62 400 end point	.11½	.11⅝	.11¼		.10¾	.11
64-66 390 end point	.12¼	.12½	.12	.12¼	.11¾	.12
64-66 375 end point	.12½	.12¾	.12¼	.12½	.12	.12¼
68-70 360 end point	.13	.13¼	.13	.13¼	.12¾	.13
NORTH LOUISIANA—						
56-58 450 end point	.10	.10¼	.10	.10¼	.09½	.09¾
58-60 437 end point (U. S. Motor)	.10¼	.10½	.10¼		.09¾	.10
60-62 400 end point	.11½	.11¾	.11½	.11¾	.11¼	.11½
64-66 390 end point	.12½	.12¾	.12¼	.12½	.12¼	.12½
64-66 375 end point	.12¾	.13	.12½	.13	.12½	.12¾
ARKANSAS—						
58-60 450 end point	.10	.10¼	.10	.10¼	.09½	.09¾
58-60 437 end point (U. S. Motor)	.10¼	.10½	.10¼		.10	
64-66 375 end point	.12½	.12¾	.12½	.12¾	.12¼	.12½
ROCKY MOUNTAIN STATES—						
*58-60 437 end point (U. S. Motor)	.13	.13¼	.13	.13¼	.12½	.12¾
PENNSYLVANIA—						
52 Naphtha	.11¼	.11½	.11¼	.11½	.11¼	.11½
54 Naphtha	.11½	.12	.11½	.12	.11½	.12
56 Naphtha	.12	.12¼	.12	.12¼	.12	.12¼
58 Naphtha	.12¼	.12½	.12¼	.12½	.12⅝	.12¾
60 Gasoline	.13½	.13¾	.13½	.13¾	.13½	.13¾
62 Gasoline	.14	.14½	.14	.14½	.14	.14½
64 Gasoline	.15	.15¼	.15¼	.15½	.15¼	.15½
66 Gasoline	.16¼	.16½	.16¼	.16½	.16¼	.16½
68-70 Gasoline	.20	.20½	.20	.20½	.20	.20½
CALIFORNIA—						
54-58 437 end point (U. S. Motor) domestic	.11	.11½	.11	.11½	.11	.11½
CHICAGO DISTRICT (Based on Group 3)—						
50-52 450 end point (Naphtha)	.09		.09		.09	
56-58 450 end point	.09¼	.09½	.09¼	.09½	.09¼	.09½
58-60 437 end point (U. S. Motor)	.10		.09¾	.10	.09½	.10
60-62 400 end point	.11½	.11¾	.11¼	.11½	.11	.11¼
64-66 375 end point	.12½	.12¾	.12¼	.12½	.12¼	.12½
68-70 360 end point	.13½	.13¾	.13¼	.13½	.13¼	.13½

*Colorado points.

NATURAL GASOLINE

	Jan. 12		Jan. 5		Dec. 29	
OKLAHOMA (Group 3)—						
Grade Double A, 80-87.9, 375 e.p., rec. 90%	.10½	.10¾	.10⅝	.10¾	.10¾	
Grade A, 72-79.9, 375 end point, rec. 90%	.10½	.10¾	.10⅝	.10¾	.10¾	
Grade Double B, 84-92, 375 e.p., rec. 85%	.09½	.09¾	.09⅞	.10	.10	.10¼
Grade B, 76-83.9, 375 end point, rec. 85%	.09½	.09¾	.09⅞	.10	.10	.10¼
Grade C, 80-90, 375 end point, rec. 78%	.09¼	.09½	.09⅜	.09⅝	.09½	.09¾
NORTH TEXAS—						
Grade Double A, 80-87.9, 375 e.p., rec. 90%	.10½	.10¾	.10⅝	.10¾	.10¾	.11
Grade A, 72-79.9, 375 end point, rec. 90%	.10½	.10¾	.10¾		.10¾	.11
Grade Double B, 84-92, 375 e.p., rec. 85%	.09½	.09¾	.10		.10	.10¼
Grade B, 76-83.9, 375 end point, rec. 85%	.09½	.09¾	.10		.10	.10¼
Grade C, 80-90, 375 end point, rec. 78%	.09½		.09½	.09¾	.09¾	
NORTH LOUISIANA—						
Grade A, 72-79.9, 375 end point, rec. 90%	.11	.11¼	.11¼	.11½	.11¼	.11½
Grade B, 76-83.9, 375 end point, rec. 85%	.10¼	.10¾	.10¾	.11	.10¾	.11
Grade C, 80-90, 375 end point, rec. 78%	.09¾	.10	.09¾	.10	.09¾	.10
CALIFORNIA—						
78-85 absorption, 360-390 end point	.15	.15½	.15	.15½	.15	.15½
78-84 compression, 350 end point	.15	.15½	.15	.15½	.15	.15½
CHICAGO DISTRICT (Based on Group 3)—						
Grade Double A, 80-87.9, 375 e.p., rec. 90%	.10½	.10¾	.10¾	.11	.10¾	.11
Grade A, 72-79.9, 375 end point, rec. 90%	.10½	.10¾	.10¾	.11	.10¾	.11
Grade Double B, 84-92, 375 e.p., rec. 85%	.09¾	.10	.10	.10¼	.10	.10¼
Grade B, 76-83.9, 375 end point, rec. 85%	.09¾	.10	.10	.10¼	.10	.10¼
Grade C, 80-90, 375 end point, rec. 78%	.09¼	.09½	.09½	.09¾	.09½	.09¾

MOTOR NATURAL GASOLINE (BLENDS)

	Jan. 12		Jan. 5		Dec. 29	
OKLAHOMA (Group 3)—						
60-62 450 end point	.09¾	.10	.09¾	.10	.09½	.09¾
64-66 437 end point	.10¼	.10½	.10¼	.10½	.10¼	
68-70 430-435 end point	.10½		.10½		.10½	
NORTH TEXAS—						
58-60 450 end point	.09½	.09¾	.09½	.09¾	.09⅝	.09½
PENNSYLVANIA—						
*60-62	.13½	.13¾	.13½	.13¾	.13½	.13¾
*64-66	.13¾	.14	.13¾	.14	.13¾	.14
*66-68	.13¾	.14	.13¾	.14	.13¾	.14
*68-70	.14	.14½	.14	.14½	.14	.14½
CHICAGO DISTRICT (Based on Group 3)—						
60-62 450 end point	.09¾	.10	.09¾	.10	.09¾	.10
64-66 437 end point	.10¼	.10½	.10	.10¼	.10¼	.10½

*At Sistersville, W. Va.

BURNING OIL

	Jan. 12		Jan. 5		Dec. 29	
KANSAS—						
41-43 water white Kerosene	.05¾	.06	.05¾	.06	.05½	.05⅝
OKLAHOMA (Group 3)—						
41-43 water white Kerosene	.05½	.05¾	.05¼	.05¾	.05¼	.05¼
42-44 water white Kerosene	.05¾	.06	.05⅝	.05¾	.05½	.05⅝
40-41 prime white Kerosene	.05⅜	.05½	.05⅛	.05¼	.05	.05⅛
NORTH LOUISIANA—						
41-43 prime white Kerosene	.05¾	.06	.05¾	.06	.05¾	.06
42-44 water white Kerosene	.06	.06¼	.06		.05¾	.06
ROCKY MOUNTAIN STATES—						
*40-44 water white Kerosene	.08½	.08¾	.08¼	.08⅜	.08	.08⅛
NORTH TEXAS—						
41-43 water white Kerosene	.05⅞	.06	.05¾	.06	.05¼	.05½
40-42 prime white Kerosene	.05½	.05⅝	.05½	.05⅝	.05	.05½
41-43 prime white Kerosene	.05⅝	.05⅞	.05½	.05¾	.05¼	.05½
42-44 water white Kerosene	.06	.06¼	.06	.06¼	.05½	.05¾
ARKANSAS—						
41-43 water white Kerosene	.05¾	.06	.05¾	.06	.05¾	.05⅞
42-44 water white Kerosene	.06		.06		.06	
PENNSYLVANIA—						
43 Kerosene prime white	.07¼	.07½	.07¼	.07½	.07¼	.07½
45 Kerosene water white	.07⅝	.07⅞	.07½	.07¾	.07½	.07¾
46 Kerosene water white	.08½	.09	.08	.08½	.08	.08½
47 Kerosene water white	.08¾	.09	.08¾	.09	.08¾	.09
34 Neutral	.07¾	.08	.07¾	.08	.07¾	.08
34 Sundebloom Neutral	.08¾	.09	.08¾	.09	.08¾	.09
36 Miners' Neutral	.07	.07¼	.07	.07¼	.07	.07¼
300 Mineral Seal	.07¾	.08	.07¾	.08	.07¾	.08
CALIFORNIA—						
40-42 water white (high burning test)	.07½	.08	.07½	.08	.07½	.08
Engine distillate, 43-45 445 end point	.08½	.09	.08½	.09	.06½	.07
Engine distillate, 42-44 450 end point	.08¼	.08½	.08¼	.08½	.06¼	.06½
CHICAGO DISTRICT (Based on Group 3)—						
41-43 water white Kerosene	.05½	.05⅝	.05¼	.05¾	.05¼	.05¼
42-44 water white Kerosene	.05¾	.05⅞	.05½	.05⅝	.05½	.05⅝

*Colorado points.

FUEL OILS

	Jan. 12		Jan. 5		Dec. 29	
KANSAS—						
24-26 Fuel Oil	1.35	1.45	1.35	1.45	1.35	1.45
32-36 Gas Oil	.04	.04½	.04	.04½	.04	.04½
38-40 Distillate	.04⅛	.04¼	.04⅛	.04¼	.04⅛	.04¼
OKLAHOMA (Group 3)—						
Below 22 Fuel Oil (sellers' cars)	1.22½	1.27½	1.22½	1.25	1.22½	1.25
22-26 Fuel Oil (sellers' cars)	1.27½	1.30	1.25	1.27½	1.25	1.27½
24-26 Fuel Oil (buyers' cars)	1.27½	1.30	1.25	1.30	1.25	1.30
24-26 Fuel Oil (sellers' cars)	1.30	1.32½	1.27½	1.30	1.27½	1.30
28-30 Fuel Oil (sellers' cars)	1.40		1.35	1.40	1.35	1.40
32-36 Gas Oil (dark)	.03⅝		.03⅝		.03½	.03⅝
32-36 Gas Oil (light)	.03⅝	.03¾	.03⅝	.03¾	.03⅝	.03¾
36-38 Distillate	.04		.04		.04	
38-40 Straw Distillate	.04	.04⅛	.04	.04⅛	.04	.04⅛
NORTH TEXAS—						
24-26 Fuel Oil (sellers' cars)	1.35	1.40	1.37½	1.45	1.45	1.50
26-30 Fuel Oil	1.45	1.50	1.55	1.60	1.65	1.70
32-36 Gas Oil (dark)	.03½	.03⅝	.03½	.03⅝	.03¾	.03⅞
32-36 Gas Oil (light)	.03⅝	.03¾	.03⅝	.03¾	.03⅞	.04
38-40 Straw Distillate	.03⅞	.04	.03⅞	.04	.04	.04⅛
NORTH LOUISIANA—						
18-20 Fuel Oil	1.12½	1.15	1.10		1.05	1.10
32-36 Gas Oil	.04		.03¾	.04	.03¾	.04
ARKANSAS—						
38-40 Distillate	.04⅛	.04¼	.04⅛	.04¼	.04⅛	.04¼
32-36 Gas Oil	.03⅞	.04	.03⅞	.04	.03⅞	.04
22-26 Refinery Fuel Oil	1.25		1.25		1.25	
GULF COAST (South Texas)—						
Gas Oil	.05	.05¼	.04¾	.05	.04¾	.05
Fuel Oil	1.55	1.60	1.50	1.55	1.50	1.55
PENNSYLVANIA—						
30-34 Fuel Oil	.05¾	.06	.05¾	.06	.05½	.05¾
36-40 Fuel Oil	.06¼	.06½	.06¼	.06½	.06	.06¼
CALIFORNIA—						
33-36 Distillate	.04¾	.05	.04¾	.05	.04¾	.05
27-35 Distillate	.04	.04½	.04	.04½	.04	.04½
15-20 Fuel Oil (at tidewater)	1.00	1.04	1.00	1.04	1.00	1.04
27 plus Diesel Oil	1.15	1.19	1.15	1.19	1.15	1.19
CHICAGO DISTRICT (Based on Group 3)—						
24-26 Fuel Oil (sellers' cars, Group 3)	1.30	1.35	1.32½	1.37½	1.25	1.30
18-22 (El Dorado)	1.27½	1.30	1.25	1.32½	1.25	1.30
18-20 (Smackover)	1.02½	1.05	1.02½	1.07½	1.02½	1.05
32-36 Gas Oil	.03⅝	.03⅞	.03⅝	.03¾	.03⅝	.03¾
36-38 Distillate	.03⅞	.04	.03¾	.04	.03⅞	.04⅛
38-40 Straw Distillate	.04⅛	.04¼	.04⅛	.04¼	.04⅛	.04⅜

LUBRICATING OILS AND WAX

	Jan. 12		Jan. 5		Dec. 29	
OKLAHOMA (Group 3)—						
70-80 vis., 2½ color, 20-25 cold test	.05	.05¼	.05	.05¼	.05	.05¼
100 vis., 3 color, 20-25 cold test	.04¾	.05	.04¾	.05	.04¾	.05
100 vis., 2 color, 20-25 cold test	.05	.05½	.05	.05½	.05	.05½
150 vis., 3 color, 20-25 cold test	.08½	.09	.08½	.09	.08½	.09
150 vis., 4 color, 20-25 cold test	.08¼	.08¾	.08¼	.08¾	.08¼	.08¾
180 vis., 4 color, 23-28 cold test	.09	.09½	.09	.09½	.09	.09½
180 vis., 3 color, 23-28 cold test	.09¼	.09¾	.09¼	.09¾	.09¼	.09¾
200 vis., 3 color, 23-28 cold test	.10¼	.10¾	.10¼	.10¾	.10¼	.10¾
200 vis., 4 color, 23-28 cold test	.10	.10½	.10	.10½	.10	.10½
220 vis., 3 color, 25-30 cold test	.13½	.14	.13½	.14	.13½	.14
220 vis., 4 color, 25-30 cold test	.13	.13½	.13	.13½	.13	.13½
240 vis., 3 color, 25-30 cold test	.13½	.14	.13½	.14	.13½	.14
240 vis., 4 color, 25-30 cold test	.13	.13½	.13	.13½	.13	.13½
280 vis., 3 color, 25-30 cold test	.15½	.16	.15¼	.16	.15½	.16
280 vis., 4 color, 25-30 cold test	.15	.15½	.15	.15½	.15	.15½
Red Neutrals:						
180 vis., 5 color, 23-28 cold test	.08¾	.09¼	.08¾	.09¼	.08¾	.09¼
180 vis., 6 color, 23-28 cold test	.09½	.10	.09½	.10	.09½	.10
200 vis., 5 color, 23-28 cold test	.09¾	.10¼	.09¾	.10¼	.09¾	.10¼
200 vis., 6 color, 23-28 cold test	.10½	.11	.10½	.11	.10½	.11
220 vis., 5 color, 25-30 cold test	.13	.13½	.13	.13½	.13	.13½
220 vis., 6 color, 25-30 cold test	.12½	.13	.12½	.13	.12½	.13
240 vis., 5 color, 25-30 cold test	.12½	.13	.12½	.13	.12½	.13
240 vis., 6 color, 25-30 cold test	.14	.14½	.14	.14½	.14	.14½
280 vis., 5 color, 25-30 cold test	.14½	.15	.14½	.15	.14½	.15

REFINERY AND CRUDE PRICES

Quotations on Principal Refined Products and Crude Petroleum Markets in All the American Oil Fields

Cylinder Stocks:						
180-200 vis., S. R. green, 40-45 cold test	.08	.08½	.08	.08½	.08	.08½
190-200 vis., S. R. green, 40-45 cold test	.07	.07½	.07	.07½	.07	.07½
170-190 dark green, 40-45 cold test	.05½	.06	.05½	.06	.05½	.06
190-200 vis. @ 210 "D" Bright Stock	.33	.35	.33	.35	.33	.35
200-210 vis. @ 210 "E" Bright Stock	.30		.30		.30	
150 vis. @ 210 "E" Bright Stock	.27		.27		.27	
150 vis. @ 210 "D" Bright Stock	.28		.28		.28	
Waxes:						
124-126 White Crude Scale Wax	.05	.05⅛	.05	.05¼	.05	.05¼
PENNSYLVANIA—						
150, 3 color	.20¼		.20¼		.19½	
180, 3 color	.22¾		.22¾		.22⅞	
200, 3 color	.26¼		.26¼		.25¾	
220, 3 color	.28		.28		.28	
600, steam refined	.19¼		.19¼		.19¼	
635, steam refined	.22		.22		.22	
650, steam refined	.24½		.24½		.24½	
600, Pennsylvania flash	.27		.27		.27	
630, Pennsylvania flash	.37		.37		.35	
*550, E filtered	.30		.30		.20	
600, E filtered	.22		.22		.22	
*600, E filtered	.22½		.23		.23	
600, D filtered	.28		.26		.26	
550, E filtered	.19		.19		.19	
550, D filtered	.22¼		.22½		.22½	
Pennsylvania Bright Stock	.39½		.39⅝		.39½	
122-124 White Crude Scale Wax	.05⅝	.05½	.05½		.05½	
†124-126 White Crude Scale Wax	.05½	.05⅝	.05⅝	.06	.05⅝	.06

*At Warren, Pa. †At New York City.

GULF COAST (South Texas)—						
Zero Black	.06	.07	.06	.07	.06	.07
No. 2 color, 100 vis., pale oil	.07½	.08	.07½	.08½	.07	.08
No. 2½ color, 150 vis., pale oil	.10	.10½	.10	.10½	.09½	.10
No. 3 color, 200 vis., pale oil	.12½	.13	.12½	.13	.12	.12½
No. 3½ color, 300 vis., pale oil	.16	.16½	.16	.16½	.15½	.16
No. 3¾ color, 500 vis., pale oil	.19	.19½	.19	.19½	.18½	.19
No. 4 color, 750 vis., pale oil	.20½	.21	.20½	.21	.20	.20½
No. 1½ plus color, 150 vis., pale filtered	.22		.22		.21½	
No. 2 plus color, 200 vis., pale filtered	.23½		.23½		.23	
No. 2 color, 300 vis., pale filtered	.27½		.27½		.27	
No. 2½ color, 500 vis., pale filtered	.31½		.31½		.31	
No. 2½ color, 750 vis., pale filtered	.41½		.41½		.41	
No. 5 to 6 color, 200 vis., red oil	.11	.11½	.11	.11½	.10½	.11
No. 5 to 6 color, 300 vis., red oil	.12½	.13	.12½	.13	.12½	.13
No. 5 to 6 color, 500 vis., red oil	.14	.14½	.14	.14½	.14	.14½
No. 5 to 6 color, 750 vis., red oil	.18½	.19	.18½	.19	.18	.18½
CALIFORNIA—						
130 pale, 2½-3 color	.10	.10½	.10	.10½	.10	.12½
200 vis., 2½-3 color	.13½	.16	.13½	.16	.13½	.16
300 vis., 3 -3½ color	.15	.17½	.15	.17½	.15	.17½
350 vis., 3½-4 color	.16½	.19	.16½	.19	.16½	.19
400 vis., 3½-4 color	.18	.20½	.18	.20½	.18	.20½
Red Neutrals:						
200 vis., 4½-5 color	.12	.14½	.12	.14½	.12	.14½
300 vis., 5 -6 color	.13	.15½	.13	.15½	.13	.15½
400 vis., 5 -6 color	.15	.17½	.15	.17½	.15	.17½
500 vis., 4½-5 color	.18	.21	.18	.21	.18	.21
500 vis., 6 -6½ color	.16	.19	.16	.19	.16	.19
600 vis., 6½ plus color	.17	.19½	.17	.19½	.17	.19½

Note: Bright stocks are not manufactured commercially on the Pacific Coast.

NEW YORK DOMESTIC MARKET

Bayonne Refinery Prices:	Jan. 12	Jan. 5	Dec. 29
U. S. Motor Gasoline, 58-60 437	.13	.13	.13
Export Gasoline, 64-66 Be.	.16	.16	.16
*Bunker Oil, 14-16 Be.	1.75	1.65	1.65
*Diesel Oil, New York City	2.20	2.10	2.10
Furnace Oil, New York City	.10	.10	.10
Gas Oil, 32-36 Be.	.06¼	.06¼	.06¼
41-43 Kerosene prime white	.07¼	.07	.07

*Lighterage 6.5c a barrel extra.

NEW YORK EXPORT PRICES

Motor Gasoline:	Jan. 12	Jan. 5	Dec. 29
58-60 Be. gravity, in cases	.27.15	.27.15	.27.15
Standard white Kerosene, in cases	.17.90	.17.90	.17.90
Water white Kerosene, in cases	.19.40	.19.40	.19.40
†Lubricating Oils (in bulk):			
Cylinder Stock, extra filtered, 600 bbls.	.34	.34	.34
Cylinder Stock, light filtered, 600 bbls.	.29	.29	.29
No. 5 Bright Stock, .897 spec. grav.	.40½	.40½	.40½
No. 1 White Neutral, .878 spec. grav.	.36	.36	.36
Pale oil, "25" .898 spec. grav.	.12	.12	.12
Pale oil, "28" .892 spec. grav.	.08	.08	.08
Special "A" red oil, .897 spec. grav., 170 vis.	.11½	.11½	.11½
No. 2 red oil, .903 spec. grav., 212 vis.	.12	.12	.12
No. 1 red oil, .905 spec. grav., 265 vis.	.13½	.13½	.13½
Polar red oil, .903 spec. grav., 295 vis.	.14	.14	.14
Paraffin Wax:			
120-122 a.m.p., per lb.	.06⅛	.06⅛	.06⅛
125-127 a.m.p., per lb.	.06¼	.06¼	.06¼
130-132 a.m.p., per lb.	.06½	.06½	.06¼
135-137 a.m.p., per lb.	.07¼	.07¼	.07¼
Petrolatum, in bbls., carload lots, per lb.:			
Amber	.03⅝	.03⅝	
Light amber	.03⅞	.03¾	.03¾
Cream	.06	.06	.06
Lily white	.08	.08	.08
Snow white	.10	.10	.10

†All lub prices in barrels.

LOS ANGELES EXPORT PRICES

	Jan. 12		Jan. 5		Dec. 29	
Kerosene water white	.05	.05½	.05	.05½	.05	.05½
U. S. Motor Gasoline, 54-56 437 end point	.08	.10	.08	.10	.08	.10

CRUDE OIL PRICES

Arkansas and North Louisiana

Caddo, 38° and above	$1.95
35° to 37.9°	1.85
32° to 34.9°	1.75
Below 32°	1.65
Homer, 35° and above	1.75
32° to 34.9°	1.65
31° to 32.9°	1.55
Below 31°	1.40
Haynesville, 33° and above	1.65
Below 33°	1.55
El Dorado, 33° and above	1.65
Below 33°	1.55
Bull Bayou, 38° and above	1.75
35° to 37.9°	1.60
32° to 34.9°	1.45
Cotton Valley	1.10
De Soto	1.80
Crichton	1.60
Bellevue	1.65
*Stephens, Ark:	
Below 26°	1.20
26° and above	1.40

*Posted by Atlantic Oil Producing Co.

Smackover: (Standard Oil Co. of Louisiana)	
Below 24°	.85
24° to 24.9°	1.15
25° to 25.9°	1.20
26° to 26.9°	1.25
27° and above	1.30
(Atlantic Oil Producing Co.)	
Below 23°	.90
23° to 23.9°	.95

Wyoming, Montana, New Mexico and Colorado

Rock Creek (Wyo.)	1.75
Salt Creek:	
29° to 29.9°	1.23
30° to 30.9°	1.31
31° to 31.9°	1.39
32° to 32.9°	1.47
33° to 33.9°	1.55
34° to 34.9°	1.63
35° to 35.9°	1.71
36° to 36.9°	1.79
37° and above	1.87
Big Muddy	1.75
Mule Creek	1.25
Grass Creek (light)	1.90
Grass Creek (heavy)	.90
Elk Basin	1.90
Lance Creek	1.90
Osage	1.90
Cat Creek (Mont.)	1.90
Sunburst (Mont.)	1.15
Lost Soldier	1.10
Greybull and Torchlight	1.90
Hamilton Dome	1.55
Hogback, (N. Mex.)	1.95
Artesia, (N. Mex.)	1.35
Florence (Colo.)	1.35

Lost Soldier and Lander based on contracts.

Oklahoma, Kansas, North and East Central Texas

*Prairie Oil & Gas Co. and other major purchasing companies except as noted.

28° to 28.9°	1.15
29° to 29.9°	1.23
30° to 30.9°	1.31
31° to 31.9°	1.39
32° to 32.9°	1.47
33° to 33.9°	1.55
34° to 34.9°	1.63
35° to 35.9°	1.71
36° to 36.9°	1.79
37° to 37.9°	1.87
38° to 38.9°	1.95
39° to 39.9°	2.03
40° to 40.9°	2.11
41° to 41.9°	2.19
42° to 42.9°	2.27
43° to 43.9°	2.35
44° to 44.9°	2.43

For crude under 28° gravity, bought only from producers having connections on November 1, 1925, Prairie Oil & Gas Co. pays on a basis of an 8-cent spread for each degree.

*Humble Oil & Refining Co. (North Texas, Ranger, Mexia, Powell, Richland, Wortham, Lytton Springs, Currie, Moran.)	
Below 28°	1.07

Other grades same as Prairie Oil & Gas.

*Magnolia Petroleum Co. (Oklahoma, Kansas and Texas.)	
Below 28°	$1.07

Other grades same as Prairie Oil & Gas Co.

Luling	1.10
Iatan	1.15
Mirando City	1.00
Corsicana heavy	1.05
Thrall	1.00
*The Texas Co. (Oklahoma and Texas)	
Below 28°	1.07

Other grades same as Prairie Oil & Gas Co.

Panhandle: (Posted by Kay County Gas Co.)	
28° to 30.9°	1.05
31° to 33.9°	1.20
34° to 36.9°	1.35
37° to 39.9°	1.55
40° and above	1.55
Gypsy Oil Co.— Bristow, Glenn Pool, Morris and Perryman:	
25° to 25.9°	.91
26° to 26.9°	.99
27° to 27.9°	1.07

Other grades same as Prairie Oil & Gas Co.

Champlin Refining Co.—	
38° to 38.9°	2.10
39° to 39.9°	2.18
40° to 40.9°	2.26
41° to 41.9°	2.34
42° to 42.9°	2.42
43° to 43.9°	2.50
44° and above	2.58

Gulf Coast

Grade A	1.50
Grade B	1.25
Luling (Magnolia)	1.40
Laredo (Magnolia Petroleum Co.)	.85
Lockhart (Magnolia)	2.25
Rockdale-Minerva (Milam County)	1.25
Calliham (Live Oak-McMullen)	2.05
Webb, Jim Hogg, Zapata	1.15
*High Island	1.20

*Posted by Sun Oil Co.

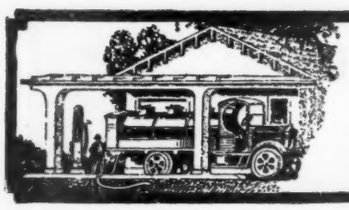
*Somerset	
Below 30°	1.25
30° to 32.9°	1.35
33° to 35.9°	1.80
36° to 38.9°	1.95
39° to 41.9°	2.10
42° and above	2.35

*Posted by Grayburg Oil Co.

Eastern States

Penna Grade Oil in New York Transit Lines	3.65
Bradford District Oil in National Transit Lines	3.65
Penna Grade Oil in National Transit Lines	3.55
Penna Grade Oil in Southwest Pa. Pipe Lines	3.55
Penna Grade Oil in Eureka Pipe Line Lines	3.50
Penna Grade Oil in Buckeye Pipe Line Lines	3.30
Cabell Grade Oil in Eureka Pipe Line Lines	2.10
Corning Grade Oil in Buckeye Pipe Line Lines	1.95
Somerset Medium Oil in Cumberland Pipe Line Lines	2.20
Somerset Light Oil in Cumberland Pipe Line Lines	2.35
Ragland Grade Oil in Cumberland Pipe Line Lines	1.15
Gaines	2.70
Lima	1.98
Wooster	2.00
Illinois	1.87
Indiana	1.78
Princeton	1.87
Plymouth	1.40
Waterloo	1.00
Oil Springs, Canada	2.45

(Continued on Page 226)



TANK WAGON MARKETS

Tank wagon quotations for gasoline and kerosene in United States as furnished by the larger marketing concerns, Jan. 12.

ALL TANK WAGON AND SERVICE STATION QUOTATIONS INCLUDE TAXES

STANDARD OIL CO. (INDIANA)

Main Service Station Price

	Gasoline Tank wagon	Gasoline Service station	Gasoline Inclds tax of	Kero. Tank wagon
Chicago Dist.—				
†Less than 100 gals.	16.0	18.0	...	11.0
Tank wagon prices on April 19, 1922; g. up 1½c; May 8, g. up 1c; June 27, g. and k. up 1c; July 19, g. down 2c, k. down 1c; Oct. 10, g. down 2c; Oct. 21, g. down 1c; Feb.. 5, 1923, g. up 1c; Feb. 20, g. up 1c; Aug. 14, g. down 6.6c; Oct. 4, k. down 1½c; Nov. 10, g. down 1.4c; Dec. 20, g. up 2c; Jan. 12, 1924, g. up 2c, k. up 1c; Feb. 5, g. up 2c, k. 1c; July 18, g. down 1c; July 30, g. and k. down 1c; Sept. 12, g. down 2c; Jan. 23, 1925, g. up 1c; Jan. 26, g. up 1c; Jan. 31, g. up 1c; Feb. 12, g. up 2c; k. up 1c; April 19, g. down 1c; July 14, g. up 1c; Aug. 25, g. down 2c, k. down 1c; Sept. 1, g. down 1c.				
Decatur, Ill.	16.2	18.2	...	11.5
East St. Louis..	15.1	17.35	...	10.6
Joliet	16.4	18.4	...	11.7
Peoria	10.5	12.5	...	11.7
Quincy	16.2	18.2	...	11.3
Davenport, Ia.	18.5	20.5	2.0	11.9
Des Moines	18.5	20.5	2.0	11.9
Keokuk	18.5	20.5	2.0	11.9
Sioux City	18.0	20.0	2.0	11.5
Duluth, Minn.	17.5	19.5	2.0	12.6
Minneapolis	17.2	19.2	2.0	12.6
La Crosse, Wis.	19.2	21.2	2.0	12.1
Milwaukee	18.1	20.1	2.0	11.3
Madison	18.3	20.3	2.0	11.5
Detroit, Mich.	18.8	20.8	2.0	12.2
Grand Rapids	18.7	20.7	2.0	12.1
Saginaw	18.9	20.9	2.0	12.3
Evansville, Ind.	19.0	21.0	3.0	11.5
Fort Wayne	19.4	21.4	3.0	11.9
Indianapolis	19.2	21.2	3.0	11.7
South Bend	19.4	21.4	3.0	11.9
Fargo, N. D.	19.9	21.9	1.0	14.6
Huron, S. D.	17.0	19.0	3.0	13.1
Sioux Falls	18.0	20.0	3.0	12.6
*K. C., Mo.	18.9	20.9	3.0	10.3
*Springfield	18.8	20.8	3.0	11.2
*St. Louis	17.6	19.9	2.5	11.0
*St. Joseph	18.0	20.0	2.5	10.9
Wichita, Kan.	17.8	19.8	2.0	10.8
Bartlesville, Ok.	16.9	18.9	3.0	9.9

*State tax is 2c. Remainder is city tax. †Quantity price on more than 100 gallons, 15.0.

The following monthly rebate system is effective on tank wagon schedules throughout the territory of the Standard Oil Co. of Indiana: Over 750 gallons, ½c; over 2,000 gallons, ¾ cent; over 3,000 gallons, 1 cent; over 6,000 gallons 1¼ cents; over 10,000 gallons, 2 cents. If quantity bought during the year is equal to 12 times the monthly agreed purchases the discount will be paid or credited on the entire quantity less monthly payments. Service station customers will receive discount of 1 cent a gallon on purchases amounting to 200 gallons a month or 2,400 gallons a year; and 2 cents a gallon on 600 gallons a month or 7,200 gallons a year.

ATLANTIC COAST DISTRICT

Standard Oil Co. (New Jersey)

	Gasoline Tank wagon	Gasoline Service station	Gasoline Inclds tax of	Kero. Tank wagon
Newark, N. J.	15.0	17.5	...	14.0
Atlantic City	15.0	....	...	14.0
Annapolis, Md.	17.0	....	...	13.5
Baltimore	17.0	20.0	2.0	11.0
Cumberland	17.0	20.0	2.0	14.0
Washington	17.0	20.0	2.0	13.0
Norfolk, Va.	18.0	21.0	3.0	14.0
Petersburg	18.0	....	3.0	14.0
Danville	18.0	....	3.0	14.0
Richmond	18.0	21.0	3.0	14.0
Roanoke	18.0	21.0	3.0	14.0
Keyser, W. Va.	18.5	....	3.5	14.0
Charleston	18.5	21.5	3.5	14.0
Parkersburg	18.5	21.5	3.5	14.0
Wheeling	18.5	21.5	3.5	14.0
Charlotte, N. C.	19.0	22.0	4.0	14.0
Hickory	19.0	....	4.0	14.0
Mt. Airy	19.0	....	4.0	14.0
Salisbury	19.0	....	4.0	14.0
Charleston, S. C.	20.0	23.0	5.0	14.0
Columbia	20.0	23.0	5.0.	14.0

SOUTHERN DISTRICT

Standard Oil Co. (Kentucky)

	Gasoline Tank wagon	Gasoline Service station	Gasoline Inclds tax of	Kero. Tank wagon
Atlanta, Ga.	22.0	25.0	3.5	16.0
Augusta	22.0	25.0	3.5	15.5
Macon	22.0	25.0	3.5	14.5
Savannah	17.0	20.0	3.5	14.0
Birm'gham, Ala.	19.0	* 22.0	2.0	15.5
Mobile	18.0	21.0	2.0	13.0
*Montgomery	20.0	23.0	3.0	16.5
Clarksdale, Miss.	19.0	22.0	3.0	13.0
Jackson	19.0	22.0	3.0	12.0
Natchez	18.5	21.5	3.0	12.5
Vicksburg	18.5	21.5	3.0	12.5
Jacksonville, Fla.	20.0	23.0	4.0	14.0
Miami	22.0	25.0	4.0	15.5
Pensacola	20.0	23.0	4.0	14.5
Tampa	20.0	23.0	4.0	14.0
Covington	19.0	22.0	3.0	15.0
Lexington, Ky.	18.0	21.0	3.0	15.0
Louisville	20.0	23.0	3.0	13.0

*In addition to the State tax of 2 cents on gasoline, Montgomery has city tax of 1 cent on gasoline and ½ cent on kerosene.

PENNSYLVANIA-DELAWARE AND PART NEW ENGLAND

Atlantic Refining Co.

	Gasoline Tank wagon	Gasoline Service station	Gasoline Incldg tax of	Kero. Tank wagon
*Pittsburgh, Pa.	17.0	22.0	...	13.0
*Philadelphia	17.0	22.0	...	13.0
*Scranton	17.0	22.0	...	13.0
*Allentown	17.0	22.0	...	13.0
Altoona	17.0	22.0	...	13.0
*Erie	17.0	22.0	...	13.0
Dover, Del.	19.0	22.0	2.0	13.0
Wilmington	19.0	22.0	2.0	13.0
Springf'ld, Mass.	17.0	19.0	...	14.5
Worcester	17.0	19.0	...	14.5
Boston	17.0	20.0	...	14.0
Providence, R.I.	18.0	21.0	1.0	14.0
Hartford, Conn.	19.0	21.0	2.0	13.5
New Haven	19.0	22.0	2.0	14.0

*Pennsylvania tax of 2 cents is collected by the dealer and paid by him direct to the State.

SOUTHWESTERN DISTRICT

***Magnolia Petroleum Co.**

	Gasoline Tank wagon	Gasoline Service station	Gasoline Incldg tax of	Kero. Tank wagon
Dallas, Tex.	15.0	19.0	1.0	12.0
Fort Worth	14.0	16.0	1.0	10.0
Houston	17.0	18.0	1.0	12.0
San Antonio	13.0	15.0	1.0	10.0
El Paso	18.0	19.0	1.0	13.0
Texarkana	17.0	20.0	1.0	12.5
Muskogee, Okla.	19.0	22.0	3.0	9.0
Oklahoma City.	19.0	22.0	3.0	12.0
Tulsa	19.0	20.0	3.0	12.0
Little Rock	18.0	21.0	4.0	13.5
Ft. Smith Ark.	18.0	21.0	4.0	13.5

*The following is the schedule of discounts on gasoline adopted by the Magnolia Petroleum Co. in Texas sales and the discounts are graded according to gallonage: Over 750 gallons a month, ⅛ cent; over 2,000 gallons, ¾ cent; over 3,000 gallons, 1 cent; over 6,000 gallons, 1¼ cents; over 10,000 gallons, 2 cents; over 9,000 gallons a year, ½ cent; over 24,000 gallons a year, ¾ cent; over 36,000 gallons a year, 1 cent; over 72,000 gallons a year, 1¼ cents; over 120,000 gallons a year, 2 cents.

The schedule on service station deliveries is: Over 200 gallons a month, 1 cent; over 600 gallons a month, 2 cents; over 2,400 gallons a year, 1 cent; over 7,200 gallons a year, 2 cents.

NEW YORK AND PART OF NEW ENGLAND DISTRICT

Standard Oil Co. (New York)

	Gasoline Tank wagon	Gasoline Service station	Gasoline Incldg tax of	Kero. Tank wagon
Albany, N. Y.	17.0	....	...	15.0
*New York	17.0	....	...	15.0
Buffalo	15.0	....	...	15.0
Rochester	15.0	....	...	15.0
Syracuse	16.0	....	...	15.0
Boston, Mass.	17.0	....	...	....
Providence, R. I.	16.0	....	1.0	....
Augusta, Me.	20.0	....	3.0	15.0
Manchester, N. H.	19.0	....	2.0	16.0
Burlington, Vt.	21.0	....	3.0	15.0

*Price in steel barrels.

Note: Standard Oil Co. of New York does not generally quote service station price in its territory. In most cases the service station price is 2 or 3 cents higher than tank wagon price.

OHIO

Standard Oil Co. (Ohio)

	Gasoline Tank wagon	Gasoline Service station	Gasoline Incldg tax of	Kero. Tank wagon
All Ohio points	20.0	22.0	2.0	13.0

ROCKY MOUNTAIN DISTRICT

Continental Oil Co.

	Gasoline Tank wagon	Gasoline Service station	Gasoline Incldg tax of	Kero. Tank wagon
Casper, Wyo.	20.5	22.5	2.5	13.0
Cheyenne	20.5	22.5	2.5	14.5
Albuquerque, N. Mex.	23.5	26.5	3.0	16.5
Salt Lake, Utah	23.0	25.0	3.5	18.0
Denver, Colo.	19.0	21.0	2.0	14.0
Pueblo	19.0	21.0	2.0	14.5
Butte, Mont.	21.0	21.0	2.0	16.0
Helena	23.0	25.0	2.0	17.0
Boise, Idaho	23.0	25.0	3.0	20.0

CENTRAL SOUTH DISTRICT

Standard Oil Co. (Louisiana)

	Gasoline Tank wagon	Gasoline Service station	Gasoline Incldg tax of	Kero. Tank wagon
*New Orleans	16.5	19.5	3.0	12.5
Alexandria	16.0	19.0	2.0	13.5
Baton Rouge	15.0	18.0	2.0	12.0
LaFayette	16.0	19.0	2.0	13.0
Lake Charles	16.5	19.5	2.0	13.5
Shreveport, La.	15.0	18.0	2.0	12.5
Memphis, Tenn.	16.5	19.5	3.0	14.5
Chattanooga	17.0	20.0	3.0	15.0
Knoxville	18.0	21.0	3.0	15.5
Nashville	17.0	20.0	3.0	15.0
Bristol	18.5	21.5	3.0	15.0
Little Rock, Ark	18.0	21.0	4.0	13.5

*Tax of 3 cents includes city tax of 1 cent.

PACIFIC COAST DISTRICT

Standard Oil Co. (California)

	Gasoline Tank wagon	Gasoline Service station	Gasoline Incldg tax of	Kero. Tank wagon
San Francisco	16.0	20.0	2.0	15.5
Los Angeles	14.5	18.5	2.0	15.5
Fresno	16.5	20.5	2.0	17.5
Reno, Nev.	21.5	25.5	4.0	19.0
Portland, Ore.	17.0	21.0	3.0	16.5
Seattle, Wash.	16.0	20.0	2.0	16.5
Spokane	20.0	24.0	2.0	20.5
Tacoma	16.0	20.0	2.0	16.5
Phoenix, Ariz.	23.0	26.0	3.0	21.5

NEBRASKA

Standard Oil Co. (Nebraska)

	Gasoline Tank wagon	Gasoline Service station	Gasoline Incldg tax of	Kero. Tank wagon
Omaha	18.25	20.25	2.0	11.5
Crawford	19.0	....	2.0	12.25
McCook	19.75	21.75	2.0	13.0
Norfolk	18.75	20.75	2.0	12.0
North Platte	19.75	21.75	2.0	12.75
Scottsbluff	19.25	21.25	2.0	12.25

TANK WAGON PRICE CHANGES

December 21—Standard Oil Co. of Kentucky advanced kerosene in Georgia, Alabama, Florida and Kentucky 1 cent.

January 1—Magnolia Petroleum Co. reduced kerosene price at Fort Worth 2 cents.

January 4—Standard Oil Co. of Kentucky advanced kerosene in Mississippi 1 cent except at Jackson where it advanced 2 cents. Continental Oil Co. advanced tank wagon and service station prices of gasoline in Colorado, Wyoming, Utah and Idaho 1 cent.

January 12—Standard Oil Co. of Ohio advanced tank wagon and service station prices of gasoline 1 cent.

CRUDE PRICE CHANGES

January 8—Ohio Oil Co. reduced Sunburst crude 20 cents.

NORTH TEXAS MARKETS SHOW MORE STRENGTH

FORT WORTH, Tex., Jan. 9.—U. S. Motor oil and export gasoline in the North Texas territory are both showing considerably more strength than a week ago. There has been also a considerable advance in the price of both. U. S. Motor oil is selling freely at 10 cents, with a strong tendency toward a higher price. In fact most refiners now are quoting this product at 10¼ cents.

About 2,000,000 gallons of 64-66 375 end point gasoline were purchased in this territory this week for which the buyers paid 12½ cents. Another million and a half gallons purchased the early part of the week brought last week's prices of 12¼ cents.

The kerosene market is still strong, with no tendency toward weakening. Quotations this week for 41-43 water white kerosene are 5¾ to 6 cents with prime white kerosene bringing about 5⅝ to 5⅞ cents.

The gas oil market is characterized as sluggish but with the price holding fairly firm at 3½ cents. Reports are that much of this product is being cracked for its gasoline content, which gives the product a demand on the part of refiners.

Refiners in the Wichita Falls territory report an unusually heavy buying in the fuel oil market. Railroads are still taking large quantities and the price has recovered from the slump which it suffered a few weeks ago. Quotations at the close of this week were $1.50 to $1.55 in the Wichita Falls territory.

The condition of the crude oil market is quiet, but still very firm. The customary premiums still prevail on the part of the independent refiners in the Wichita Falls district. But there is less talk of an advance in crude right now than a month ago.

WELLS FOR LAGO PETROLEUM

Lago Petroleum Corp. reports completed well No. 17 for 4,500 bbls. of oil a day, and No. 40 for 5,000 bbls. a day, in La Rosa Field, Venezuela.

CRUDE OIL PRICES

(Continued from Page 225)

Petrolia, Canada	2.38
*Western Kentucky, 36° and above	1.80
*Western Kentucky, 35° to 35.9°	1.70
Western Kentucky, 32.9° and below	1.60
Cumberland, Barren, and Monroe Counties (Kentucky), (Paragon Development Co.)	2.35
*Prices for Warren, Allen, Hancock, Simpson and Ohio Counties by Indian Refining Co.	
Mexican Crude	
*Tuxpam light (f.o.b. Mex. ports)	1.75
§Panuco heavy (f.o.b. Mex. ports)	1.45
Tuxpam (New York)	2.25
Panuco (New York)	1.82

*Plus 30:45c tax. §16.94c tax.

CALIFORNIA PRICES

Gravity	Long Beach	Richfield Huntington Beach Brea-Olinda	Rosecrans	Torrance Inglewood	Whittier La Habra Montebello	Coyote	Santa Fe	Kern River Newhall McKittrick	Midway-Sunset Elk Hills	Lost Hills Beiridge	Coalinga	Wheeler Ridge
14°	$ .85	$ .85	....	$ .85	$ .85	$ .85	....	$ .75	$ .75	$ .75	$ .75	$ .75
15°	.87	.87	....	.87	.85	.85	....	.75	.75	.75	.75	.75
16°	.90	.90	....	.90	.85	.85	....	.75	.75	.75	.75	.75
17°	.94	.94	....	.94	.85	.85	....	.75	.75	.75	.75	.75
18°	.98	.98	....	.98	.85	.85	....	.75	.75	.75	.75	.75
19°	1.02	1.02	....	1.02	.85	.85	....	.75	.75	.75	.75	.75
20°	1.06	1.06	....	1.06	.87	.88	....	....	.79	.79	.79	.78
21°	1.10	1.10	....	1.10	.89	.94	....	....	.84	.84	.84	.81
22°	1.14	1.14	....	1.14	.91	1.00	....	....	.92	.92	.89	.84
23°	1.18	1.18	....	1.18	.94	1.06	....	....	1.00	1.00	.94	.87
24°	1.22	1.22	....	1.22	.97	1.12	.97	....	1.08	1.08	.99	.90
25°	1.26	1.26	....	1.26	1.00	1.18	1.05	....	1.16	1.16	1.04	.93
26°	1.30	1.30	$1.30	1.30	1.03	1.24	1.13	....	1.24	1.24	1.09	.96
27°	1.34	1.34	1.34	1.34	1.06	1.30	1.21	....	1.32	1.32	1.14	.99
28°	1.38	1.38	1.38	1.38	1.09	1.36	1.28	....	1.40	1.40	1.19	....
29°	1.42	1.42	1.42	....	1.12	1.42	1.34	....	1.48	1.48	1.24	....
30°	1.46	1.46	1.46	....	1.15	1.48	1.40	....	1.56	1.56	1.29	....
31°	1.52	....	1.52	....	....	....	1.46	....	1.64	1.64	1.34	....
32°	....	....	1.58	....	....	....	1.52	....	1.72	1.72	1.39	....
33°	....	....	1.64	....	....	....	1.60	....	1.80	1.80	1.44	....
34°	....	....	1.70	....	....	....	1.68	....	....	1.88	1.49	....
35°	....	....	1.76	....	....	....	1.76	....	....	....	1.54	....
36°	....	....	1.84	....	....	....	1.84	....	....	....	....	....
37°	....	....	1.92	....	....	....	1.92	....	....	....	....	....
38°	....	....	2.00	....	....	....	2.00	....	....	....	....	....
39°	....	....	2.08	....	....	....	....	....	....	....	....	....
40°	....	....	2.16	....	....	....	....	....	....	....	....	....
41°	....	....	2.24	....	....	....	....	....	....	....	....	....
42°	....	....	2.30	....	....	....	....	....	....	....	....	....

SINCLAIR OILS

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Gasoline Manufacture in California

Signal Hill Plant of the California Petroleum Corporation 140 Per Cent Efficient. Laboratory Method of Control

By George W. H. Reid

The California Petroleum Corp., owning and operating some 50 producing wells in the Signal Hill Field at Long Beach, is also one of the largest producers of natural gas in that field. Controlling, as it does, many millions of cubic feet of natural gas in the various fields of California, it has, as a consequence, entered the field of gasoline manufacture during the last few years, and has installed absorption type gasoline plants in all fields where steady, settled production of its wells will justify the installation of permanent, modern equipment.

The installation, development and operation of these plants in this organization is under the direction of D. A. Cushman. In this writing the absorption plant of the Signal Hill district will be discussed.

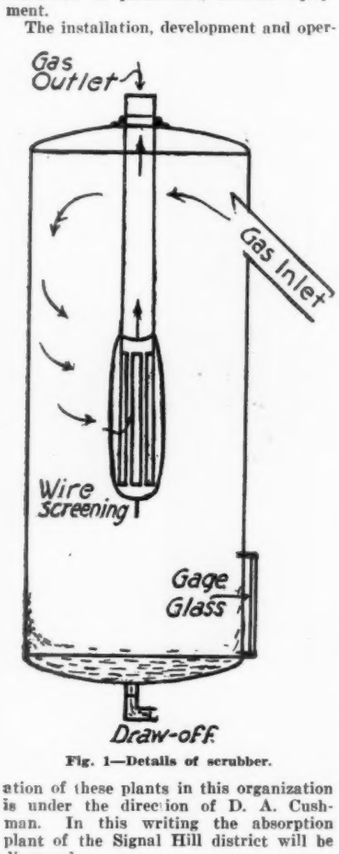


Fig. 1—Details of scrubber.

The gas supply is derived from the company's own wells, which amounts to a total production at present of around 8,000,000 cubic feet daily. This gas is of the usual type found in the Signal Hill Field, from which an average yield of 1.5 gallons per thousand cubic feet should be expected. This yield is based upon the activated charcoal method of testing for gasoline content. Due to the degree of efficiency of treating the gas, the automatic control features installed and to strict and diligent attention and inspection by the laboratory department, this plant is operating at an efficiency of 140 per cent, based upon the atmospheric charcoal test. Details of the plant control feature will be given later.

The gas is collected in the usual manner and boosted to the absorption plant. An 18-inch vacuum is maintained on the wells and the gas boosted to about 35 pounds pressure for delivery to the gasoline plant. There are two booster stations serving this gasoline plant, one being about one-half mile distant and consisting of six twin Bessemer 165 horsepower engines, driving Ingersoll-Rand Imperial type 10 compressors. The second booster station is located on the same property and adjacent to the gasoline plant. This station consists of 12 engines and compressors of the same type as employed in the first station. A portion of these machines are used to compress the dry gas leaving the absorbers, discharging it at 150 pounds pressure into lines for delivery to the fuel gas companies.

Type of Scrubber

From the booster the gas is conducted to the absorbers, first passing through a large scrubber. The details of the scrubber, which is of company design, are shown in Figure 1. Entering the side of the chamber at a slight angle the gas is given a whirling motion and in its travel around the circumference of the scrubber the foreign matter, such as water, muck and dirt, if present, flows down the sides of the chamber or falls to the bottom, where it is collected and its volume indicated by the gauge glass. The accumulation of foreign matter is drawn off whenever necessary. The nipple employed as the gas outlet extends into the scrubber about two-thirds of its length, the end being split with a welding torch, as shown in the diagram. A fine wire screen is then wrapped around the split section which acts as a further cleaning device. This large scrubber was installed only after its efficiency had been definitely ascertained by experimentation on a small scale.

Leaving the scrubber the gas enters the absorber towers, eight in number. The towers are 36 inches by 50 feet, of conventional design—wood lath baffle type—each designed to handle 1,000,000 cubic feet of gas daily. The plant is at present treating close to 8,000,000 cubic feet, but that there is a great elasticity of capacity is certain, for at one time the system was treating over 15,000,000 cubic feet daily and there was no discernible lowering of efficiency due to the overload.

The most striking feature of all modern and efficient gasoline plants is their apparent ease of operation, and the smooth, uninterrupted manner in which they circulate the various hot and cold, rich and lean, oils, vapors and distillates. This is made possible, of course, by the installation of modern, dependable control instruments. The California Petroleum installations are equipped with control devices throughout the plants. The pumps charging lean oil to the absorbers are governed by Mason Speed Governors controlling the number of pump strokes while a Fisher Kidney float and Mason steam govern controls the flow and level of oil at the absorbers. Rich oil pumps are likewise controlled with precision. These features, however, are familiar to the trade and need no further detailing here.

Figure 2 shows the compactness of installation of the equipment for handling the oil after leaving the absorbers. Two of the five pumps shown are handling lean oil to the absorbers, one is idle and auxiliary, being manifolded for use with either rich or lean oil. The other two pumps pick up the enriched oil at the absorbers and charge it to the heat exchangers. All these pumps are Fairbanks-Morse 8 by 5 by 12-inch. In fact this type and make of pump is used throughout the entire system wherever transfering is done. There is no doubt about the advisability of standardizing on a certain size and type of pump, if for no other advantage than the interchangeability of parts.

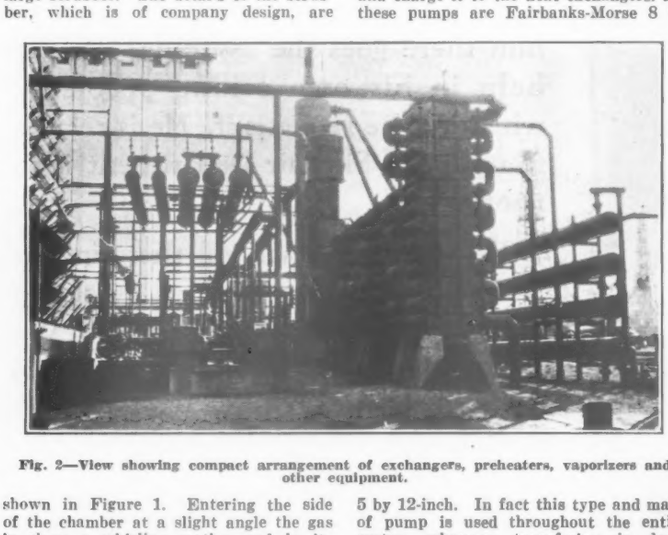


Fig. 2—View showing compact arrangement of exchangers, preheaters, vaporizers and other equipment.

Flow of Rich Oil

The enriched oil is discharged into the interchanger, shown in Figure 2, entering this apparatus at about 84 degrees Fahrenheit, where it is heated to about 275 degrees Fahrenheit, an increase in temperature of 190 degrees Fahrenheit. The lean oil enters the exchanger at 310 degrees Fahrenheit to leave at a temperature of 175 degrees Fahrenheit, at a change of 185 degrees Fahrenheit. These are average representative temperatures, taken from plant operation records.

From the exchanger it passes to the preheater which is heated by steam from the boilers to about 320 degrees Fahrenheit. From preheater it passes to vaporizer or "still." The oil and vapors in the vaporizer are kept in agitation by exhaust steam from the pumps. The separated oil and condensed water, upon leaving this operation, are separated under operating pressure, thus avoiding the emulsion which occurs when separation is attempted at atmospheric pressure. The interchangers, preheater, separator, pre-condenser, dephlegmator and a portion of the condenser system, are of the "Southwestern" type.

The gasoline vapors leaving the vaporizer enter the dephlegmator after passing through a pre-condenser. The reflux condensed and accumulated in the dephlegmator is returned to lean oil and charged again through the absorbers. This practice is unusual and some operators maintain that it cannot be done, but during the last nine months no trouble or decrease in efficiency has materialized.

The gasoline vapors are condensed in the usual manner. After condensation the gasoline, about 15,000 gallons daily production, is moved through a 3-inch pipe line a distance of about 8 miles, to the company's and other refineries at Watson, Calif. This transferring is done by a Fairbanks-Morse 8 by 5 by 12-inch pump equipped with steel piston rings. This pump is set four feet below ground level, thus providing a constant head of gasoline so that the pump has suction until the tank or tanks are empty. Usually the working pressure on this line is approximately 125 pounds per square inch. The production is moved daily to the markets which does a great deal toward reducing the loss incurred with storing and lowers the fire hazard at the same time.

The specifications of the gasoline produced at present are about 80 gravity, 80 degrees Fahrenheit. Initial boiling point, 375 or under in end point, about 90 per cent recovery and less than 12 pounds vapor tension.

Absorption Oil

The company does not use the conventional mineral seal oil common to most absorption plants, but employs as an absorbing medium a specially prepared distillate derived from California crude.

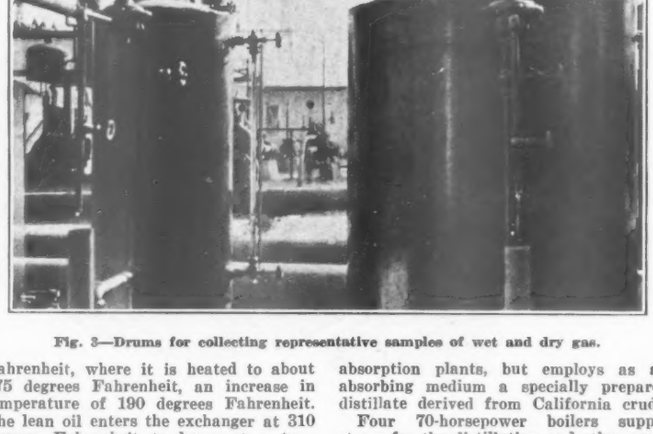


Fig. 3—Drums for collecting representative samples of wet and dry gas.

Four 70-horsepower boilers supply steam for the distillation and other operating units. These boilers are set at sufficient distance from the plant to eliminate fire hazard.

Plant Control

Not many years ago the average gasoline plant operator would have dismissed

as impractical the idea of attempting laboratory control of plant operations. There are still numbers of them who refuse to accept the doctrine of interval inspection and daily testing of their oils, gases and gasolines. With the development and standardization of the activated charcoal test, however, the number of plant laboratorians is steadily increasing.

In all of the California Petroleum Co.'s absorption plants the laboratory and plant control feature has been developed and adopted, and from this department much valuable information is derived. The technicians of the organization have developed little economies, increased efficiency of various steps here and there, until the department is certain of showing a neat profit.

The plant laboratorian runs a charcoal test each morning on a representative sample of the rich or wet gas, coming into the plant, and on the lean gas leaving the absorbers. Figure 3 illustrates the equipment installed for collecting the daily representative sample of gas. The two containers or drums shown are filled with water, then the lines leading from the wet and dry gas mains are opened, which permits the wet gas to enter the small drum to the right of the illustration, and the dry or lean gas to enter the large drum. The rate of gas accumulation is governed by the valve on the water outlet line. This valve is opened sufficiently to permit just enough water to escape so that the gas displaces the water from the drums in 24 hours' time. The gas, of course, is entering and leaving the absorbers at 35 pounds pressure and thus the gas sample collecting drums are also operating at this pressure.

Each morning the gas is removed from the drums, measured through a meter and subjected to selective absorption in passing through the regular 250 cc. of activated cocoanut shell charcoal. The absorbed gasoline is subsequently distilled from the charcoal in the presence of glycerine. The details of this test and its practical application are familiar to the industry but as reference for further detailed information, see "Practical Value of Charcoal Test," by W. R. Lentz, November 26 issue of The Oil and Gas Journal.

This inspection of the wet gas shows the number of gallons per 1,000 cubic feet of gas coming into the plant during the previous 24 hours. The dry gas test indicates the efficiency of the towers in absorbing. These two tests are of utmost importance to the plant operator, for obvious reasons.

Advantage of Control

The absorption oil is subjected to distillation and inspection after enriching and after distillation, thus checking the net saturation, the efficiency of distillation, separation, dephlegmation and indicates any necessary increase or decrease in the volume of oil to be circulated.

The routine tests of gasoline produced, of course, include the usual distillation for initial boiling point, end point and recovery, along with gravity and vapor tension. These things must be guarded closely for gasoline is marketed on contracts which definitely state the specifications.

Each separate test or inspection is indicative of the well-being and smooth operation of some step in the system. Any variation occuring from the expected results of the inspection is informative of trouble in some portion of the plant equipment, and when such indications present themselves, the trouble can be quickly corrected.

Because of the benefits to be derived from laboratory control the more progressive gasoline manufacturers are steadily developing this feature, and along these lines the California Petroleum organization has pioneered; and the satisfactory results secured in so doing, indicate that the statement of a certain technologist, that "the manufacture of gasoline is a scientific operation, and should be scientifically controlled," is correct in its entirety.

TAKING UP CRESCENT LINE

PITTSBURGH, Pa., Jan. 9.—Crescent Pipe Line Co. removed 51½ miles of its pipe before cold weather prevented further work. There remains 222 miles of pipe to be removed. Liquidation of the company cannot be completed until late next summer. Discontinuation of operation was made necessary when customers decided to obtain supplies of crude by tank ship.

CONTINENTAL OIL BUYS TEXHOMA OIL & REF. CO.

(Continued from Page 32)

Electra and Burkburnett fields of Wichita County and several pools in Archer and Young Counties. Practically all of the oil is high gravity, shown by the fact that the 432,882.03 bbls. produced the third quarter of 1925, according to the latest Texas gross production report, brought an average price of $2.21 per barrel.

The company's pipe line system consisting of approximate'y 100 miles of main line connects to the Electra, Burkburnett and Archer County pools. The company has been a great aid to other refiners of the Wichita Falls area since it has gathered and transported to these plants large quantities of crude. The company has gasoline plants located in the Electra and Burkburnett fields with an approximate capacity of 10,000 gallons daily.

The company's wholesale and retail marketing facilities have been gradually extended during the past five years so that it now ranks among the first 10 companies in Texas in gasoline sales.

W. B. Hamilton

The company has about 75 bulk stations in the State with several retail stations in the Wichita Falls area.

Continental Expansion

Acquiring the controlling interest in the Texhoma company is only one of several important purchases or mergers which has been negotiated by the Continental Oil Co. during the past two years and which account for the fact that the company's outstanding capital stock increased from $10,000,000 in 1924 to over $33,000,000 in 1925. In April, 1924, the company entered a merger with the Mutual Oil Co. Previous to that its activities were principa'ly confined to marketing in the Rocky Mountains where as the Standard company it has always been the most important distributor of refined products. The Mutual merger added about 300 stations in the states west of the mountains and east of the Mississippi River. Since this merger the company has entered Oklahoma with its marketing facilities. The Mutual also had extensive producing and refining properties in the Mid-Continent and Wyoming area. Another company taken over during the past year and a half was the Sapulpa Refining Co. with small production and a large refinery at Sapulpa.

Refining Capacity

With the Texhoma refinery the Continental now has eight refineries well located for the consuming territories in which it markets. These plants and their capacity are as follows: Artesia, N. Mex., 1,500; Farmington, N. Mex., 1,000; Glenrock, Wyo., 10,000; Cowley, Wyo., 2,000; Sapulpa, Okla., 8,000; Wichita Falls, Tex., 7,000; Florence, Colo., 1,500, and Chanute, Kans., 1,000. The latter plant has been shut down for some time and the Farmington plant is closed down temporarily.

With the Texhoma properties the company will have a daily crude production of approximately 30,000 bbls. daily. This production is located in the States of Montana, Wyoming, Oklahoma, New Mexico, Colorado, Texas and Louisiana.

Although no announcements have been made of changes in the management of the Texhoma company it is believed that President Hamilton and Vice President Martin will shortly retire to devote their time to private interests.

OIL SECURITIES WERE ACTIVE AND LOWER

(Continued from Page 216)

the dividend on the common might be increased. The corporation recently has taken two steps which have made such a course possible. The first was the sale of a half interest in its Texas pipe line to the Prairie Pipe Line Co. The second was the announcement that the company, on February 1, would pay off the remaining $6,000,000 Humphreys Oil Co. purchased money obligations, anticipating by six months payment of the $3,000,000 due on August 1, next.

Mid-Continent Earnings

Net income of the Mid-Continent Petroleum Co. for 1925, according to preliminary figures, will range between $6,500,000 and $7,000,000. The official statement is not expected for several weeks. It is estimated that the earnings after all deduction will approximate from $5 to $5.50 a share earned on the outstanding stock, as against 69 cents a share earned in 1924.

The balance sheet as of November 30, 1925, showed current assets at $23,131,484, including $7,519,939 cash, $2,000,000 treasury certificates, and $1,000,000 in call loans. Current liabilities were $2,270,412, leaving net working capital of $20,861,036.

Phillips Petroleum

The Phillips Petroleum Co. announces that it will retire all outstanding bonds. The company has $3,200,000 worth of 7½ per cent debentures issued. Retirement of these bonds will leave the company without any senior securities or other indebtedness other than current accounts.

Fuhrman Petroleum Co.

The Fuhrman Petroleum Co. of Okmulgee, Okla., has announced that it will pay a cash dividend of 150 per cent on January 15 to stockholders of record January 11. Practically all of the stock of this company is owned in Okmulgee, Okla. The Fuhrman Petroleum Co. is capitalized at $350,000 and 170,000 shares of stock with a par value of $1 each are outstanding.

EXPORT BUYING AIDS GASOLINE MARKET

(Continued from Page 28)

uary 1 were 15,225 bbls. greater than on December 1, a month previous, based on The Oil and Gas Journal's report which will be found elsewhere in this issue. This apparently reflected a move on the part of some refiners to boost their production as a result of the fairly good refined prices.

Outside of the export purchases, the refined market was uneventful. Domestic buying was slow with jobbers evidently heeding the advice of some association officials that it would be poor policy to stock up with gasoline at this time in anticipation of spring demand.

This association pointed out that if jobbers rushed in to buy now it would only cause refiners to "jazz up" their runs with the result that when the buying ceased refiners would not be able to reduce their operations quickly and thus later there would be an oversupply breaking the market. This advisor strongly urged jobbers to continue buying only for their actual needs and told them to "keep your feet on the ground and watch your step during the next four months, and the oil industry will make some money and develop some public confidence and respect during the year 1925."

So far, January has been devoid of any speculative buying on the part of marketers. This is in contrast to the previous month when these buyers made fairly large purchases for December in anticipation of higher prices the latter part of the month. Some of these marketers paid as high as 10½ cents early in December when the spot market was around 10 cents but soon after these purchases the market slipped and these buyers were forced to sell at losses.

Gasoline and Naphtha

Although domestic demand continued light, the strength felt in high gravity gasolines as a result of the export purchases during the week was reflected in all grades of gasoline and naphtha. As mentioned, actual prices of market movements were practically unchanged over a week ago, yet concessions, which were freely made the middle of the week when the market sagged, were almost entirely eliminated.

Some buyers seemed to feel that U. S. Motor (58-60 437) gasoline was easy and reported offers of 9⅞ cents but apparently 10 cents was the firm and ruling price. A few refiners advanced quotations to 10¼ cents. A survey of the 60-62 400 market showed that none of this product was available under 11⅜ cents, which was an advance of ⅛ cent over last week. Domestic grades of 64-66 375 could still be purchased for 12¼ cents although exporters were offering more than this price.

A bullish factor in the gasoline situation was the advance of 1 cent in tank wagon prices Tuesday by the Standard Oil Co. of Ohio. Considerable Oklahoma gasoline is marketed in Ohio and some contracts are based on those prices.

Natural Gasolines and Blends

The natural gasoline situation was described as practically inactive. Although there are claimed to be no excessive stocks of any grade a lack of demand prevents any particular firming of the products. Natural gasoline manufacturers are looking forward to a marked increased demand as a result of the export buying the past week but late Tuesday none had developed. Market prices were somewhat lower Tuesday than a week ago with the A grade obtainable at 10½ cents, B at 9½ cents and C at 9¼ cents. Blended gasolines were unchanged.

Kerosenes and Distillates

Because of the acute tightness of kerosene, prices of this product were higher the past week than at any other time in more than a year. Practically no 41-43 kerosene was available for immediate shipment, but prices on orders ranged from 5½ to 5¾ cents, with the 42-44 water white grade bid as high as 6 cents. Distillates were unchanged but an increased movement was expected as a result of the cold weather in the northern and middle western States. Practically all orders for distillates the past week were for zero cold test products.

Fuel Oil and Gas Oil

Fuel oils and gas oil were slightly easier during the week but by Tuesday this situation had improved some and a stronger tone was apparent with higher prices prevailing. Tuesday practically no 24-26 fuel was available under $1.30 but there was little moving above $1.32½. Lower grade fuels perhaps were the strongest with only slight differentiations in market prices. The bulk of movements of all fuel under 24 gravity was at $1.27½ although some 18-22 fuel was bought at $1.25. Gas oil prices were unchanged with 3⅝ cents the ruling market.

Lubricants and Wax

Movements of lubricating oils held up fairly well during the week, manufacturers reported, but as mentioned in previous market reports, little change is expected at this season unless there is a change in crude prices. Wax showed a slightly better demand with orders filled at 5 to 5¼ cents, one shipment of 50 tons going at the higher figure.

NORTH CENTRAL TEXAS

(Continued from Page 46)

at 3,800 feet; Mid-Kansas Oil & Gas Co.'s No. 1 Williams, dry at 3,565 feet.

Brown County

Adams and others' No. 1 Newton, 20 bbls. at 3,005 feet; Casden and others' No. 3 Chambers, dry at 1,320 feet, Prairie Oil & Gas Co.'s No. 10 Gaines, 15 bbls. at 1,292 feet; No. 11 Gaines, 50 bbls. at 1,278 feet; Schaffner and others' No. 4 Prather, 10 bbls. at 1,300 feet.

Callahan County

Brannon and others' No. 1, Block 5, dry at 1,472 feet; Cranfill and others' No. 1, Block 37, dry at 1,471 feet; Hamil Drilling Co.'s No. 1, Block 24, 200 bbls. at 1,464 feet; Mitchell and others' No. 1, Block 24, 150 bbls. at 1,450 feet; Root and others' No. 1, Block 1, dry at 2,400 feet.

Wheeler County

Midwest Exploration Co.'s No. 1-A Williams & Laycock, 20 bbls. at 2,238 feet.

Baylor County

Pandem Oil Corp.'s No. 1 Portwood, dry at 1,475 feet; Hooser and others' No. 13 Mills, 35 bbls. at 1,414 feet.

Clay County

Murchison and others No. 1 Halsell, dry at 3,780 feet.

Montague County

Pure Oil Co.'s No. 4 Maddox, 30 bbls. at 928 feet.

Cooke County

Sun Oil Co.'s No. 1 Ludeman, dry at 3,334 feet.

Wise County

Magnolia Petroleum Co.'s No. 1 Cassidy Southwestern, dry at 5,858 feet.

Throckmorton County

McDonald and others' No. 1 Upsher County, dry at 1,603 feet.

Shackelford County

Hope Petroleum Co.'s No. 1 Green, dry at 1,300 feet; Phillips Petroleum Co.'s No. 2 Compton, 90 bbls. at 3,578 feet.

Mitchell County

California Co.'s No. 10 Abroms, 100 bbls. at 3,031 feet.

Coleman County

Canary and others' No. 1 Morris, 5,500,000 feet of gas at 2,255 feet.

Upton County

Dixie Oil Co.'s No. 1 Burleson, dry at 572 feet.

Pecos County

Dixie Oil Co.'s No. 1 Sherbine, dry at 1,725 feet.

Wichita County Drilling

Burt and others' No. 1 Hansard, drilling at 2,060 feet; Dyson and others' No. 1 Holder, 736 feet; Magnolia Petroleum Co.'s No. 12 Beach, 240 feet; No. 126 Reilly, 280 feet; Robinson and others' No. 21 Roller, 970 feet; Texhoma Oil & Refining Co.'s No. 1-A Beach, 1,875 feet; Vannest Oil Co.'s No. 19 M. K. & T., 750 feet; Panhandle Refining Co.'s No. 4 Jackson, fishing at 1,783 feet; Apple and others' No. 1 Fisher, sand at 1,706 feet; Beaudoin and others' No. 1 Snow, drilling at 1,720 feet; Duffy and others' No. 1 Schroeder, 1,400 feet; Empire Gas & Fuel Co.'s No. 17 Pierce, 540 feet; Hammond and others' No. 7 Waggoner Brothers, 800 feet; No. 1-B Burnett, 1,600 feet; Hunter and others' No. 8 Waggoner Brothers, 1,400 feet; McCarty Oil Co.'s No. 1 Jennings, 1,410 feet; Madison Oil & Gas Co.'s No. 14 Burnett, 400 feet; Magnolia Petroleum Co.'s No. 66 Allen, underreaming; No. 13 Maer, drilling at 750 feet; No. 9 Watkins, 860 feet; Panhandle Refining Co.'s No. 1 Roberts, 600 feet; Perkins and others' No. 4 Beaver Electra, 500 feet; Shappell Oil Co.'s No. 7-A McCarty, 800 feet; Texhoma Oil & Refining Co.'s No. 4-M Burnett, 1,500 feet; No. 13 Waggoner Brothers, 410 feet; No. 2 Waggoner Brothers, 1,215 feet; White Brothers and others' No. 2 Old 1,15 feet; Wolfe and others' No. 3 Daume, 1,600 feet.

Stephens County

Gardner and others' No. 2 Cunningham, 2,750 feet; Mid-Kansas Oil & Gas Co.'s No. 7 Hill, 2,840 feet; No. 8 Hill, 2,200 feet; No. 9 Hill, 580 feet; Mid-Tex Oil Co.'s No. 3 Cunningham, 2,285 feet; No. 4 Cunningham, 400 feet; No. 1 Morrison, 2,720 feet; Prairie Oil & Gas Co.'s No. 1 Donnell, 2,250 feet; Rhodes and others' No. 1 Langford, 2,890 feet; Texas Consolidated Oil Co.'s No. 7 Martin, 1,965 feet; Adamson and others' No. 2 Bradford, 1,575 feet; Brown & Co.'s No. 4 Akin, 2,175 feet; Chastain and others' No. 1 Young, 2,300 feet; Hickok P. & D. Co.'s No. 1 Parks, 2,300 feet; Hughes and others' No. 5 Gandy, 1,420 feet; Hughes and others' No. 1 Long, underreaming; No. 1 Thompson, cleaning out at 2,072 feet; Landreth Production Co.'s No. 1 Akin, drilling at 1,320 feet; No. 1 Guest, setting casing at 3,005 feet; Magnolia Petroleum Co.'s No. 2 Akin, drilling at 920 feet; McKinney and others' No. 2 McCleskey, 1,250 feet; Producers Union Oil Co.'s No. 1 Moon, 2,700 feet; Scanlon and others' No. 1 Ming, 3,454 feet; States Oil Corp.'s No. 3 Cooper, showing oil at 3,712 feet; No. 2 Hawkins, setting casing at 2,375 feet; Texas Pacific Coal & Oil Co.'s No. 7 Adams, drilling at 3,635 feet; No. 58 Binney, 285 feet; No. 60 Binney, showing oil at 1,716 feet; No. 4 Hand, drilling at 3,595 feet; No. 8 Veale, fishing at 4,050 feet; No. 10 Veale, drilling at 900 feet; The Texas Co.'s No. 2 Grimes, cleaning out at 3,347 feet; Walker-Coldwell's No. 1 Keathley, cleaning out at 3,545 feet.

Eastland County

Carter and others' No. 1 Falls, drilling at 3,460 feet; Eastland Oil Co.'s No. 1 White, 750 feet; Halmack Oil Co.'s No. 1 Allison, 450 feet; Hoffer Oil Corp.'s No. 1 Thurman, fishing at 3,267 feet; Lightfoot and others' No. 3 Allen, cleaning out at 2,310 feet; Magnolia Petroleum Co.'s No. 9 Hawkins, spudding; Robert Oil Corp.'s No. 1 Gullett, spudding; No. 1 Hand, drilling at 1,700 feet; Bowden and others' No. 1 Harris, 790 feet; Goodwin and others' No. 1 Burnett, 3,320 feet; Leon Oil Co.'s No. 1 Kimbrough, 1,800 feet; Pitzer and others' No. 1 Martin, setting casing at 1,730 feet; Reeves and others' No. 1 Leveridge, cleaning out at 3,250 feet; Root and others' No. 1 Luse, cleaning out at 3,336 feet; Rumbough and others' No. 1 White, drilling at 1,500 feet; States Oil Corp.'s No. 1 Hise, 2,100 feet; The Texas Co.'s No. 1 Bivins, 5,620 feet.

Hutchinson County

American Refining Co.'s No. 1 Weatherly, plugging back at 3,080 feet; Conyon Oil Co.'s No. 1 Whittenburg, drilling at 2,300 feet; No. 2 Whittenburg, setting casing at 650 feet; Centerfield Oil Co.'s No. 1 Smith, drilling at 2,885 feet; Crosbie and others' No. 1 Whittenburg, spudding; Crosbie Brothers' No. 1 Smith, underreaming; Dixon Creek Oil Co.'s No. 2-A Smith, showing oil at 2,865 feet; Drysdale Oil Co.'s No. 1 Weatherly, drilling at 1,650 feet; Gibson Oil Co.'s No. 1 Whittenburg, 350 feet; Holmes and others' No. 1 Smith, spudding; Lenix and others' No. 1 Smith, drilling at 500 feet; McIlroy and others' No. 1 Smith, drilling at 1,600 feet; McKinney and others' No. 1 Weatherly, 2,330 feet; McIlroy Brothers' No. 2 Smith, 2,375 feet; McMillen and others' No. 1 Whittenburg, spudding; Middleton and others' No. 2 Weatherly, drilling at 2,840 feet; Native Oil Co.'s No. 1 Johnson, setting casing at 2,180 feet; New Domain Oil Co.'s No. 1 Barton, fishing at 3,132 feet; Prairie Oil & Gas Co.'s No. 1 Johnson, drilling at 610 feet; No. 2 Weatherly, underreaming; Phillips Petroleum Co.'s No. 1 Weatherly, drilling at 2,190 feet; Pulaski Oil Co.'s No. 1 Smith, 450 feet; No. 2 Smith, spudding; Hutchinson Oil Co.'s No. 2 Whittenburg, drilling at 2,200 feet; Tex-O Oil Co.'s No. 1 Johnson, drilling at 2,735 feet; Travelers Oil Co.'s No. 1 Kingslord, 2,800 feet; Twin Six Oil Co.'s No. 2 Kingslord, 2,435 feet; No. 4 Kingslord, 400 feet; Westex Oil Co.'s No. 1 Whittenburg, 2,100 feet; No. 2 Whittenburg, spudding; Whittington and others' No. 1 Kingslord, drilling at 2,100 feet.

Carson County

Amarillo Oil Co.'s No. 3-B Bivins, drilling at 2,415 feet; No. 6 Barnett, setting casing at 2,030 feet; No. 5-A Burnett, drilling at 2,850 feet; Cosden and others' No. 1 Burnett, setting casing at 535 feet; Gates Oil Co.'s No. 2 Burnett, drilling at 2,800 feet; The Texas Co.'s No. 4 M. C. Burnett, 1,897 feet.

Anderson and others' No. 1 Beavers, drilling at 3,665 feet; Osborne and others' No. 1 Byrum, 3,200 feet; Wilcox and others' No. 2 Worley & Reynolds, 750 feet; Empire Gas & Fuel Co.'s No. 1 Heithholt, 2,920 feet.

Wheeler County

McFarland and others' No. 1 Kochelhoffer, drilling at 1,755 feet; Midwest Exploration Co.'s No. 1 Company, 2,985 feet.

Hall County

Hudspeth and others' No. 1 Fuston, drilling at 1,630 feet.

Roberts County

Engle and others' No. 1 Ledrick, underreaming.

Moore County

Amarillo Oil Co.'s No. 2-A Masterson, fishing at 1,850 feet.

Potter County

Amarillo Oil Co.'s No. 4-A Bivins, drilling at 2,725 feet; Prairie Oil & Gas Co.'s No. 1 Bivins, 2,643 feet.

Collingsworth County

Continental Oil Co.'s No. 1 Hughes, underreaming.

Hardeman County

Staley and others' No. 1 Evans is spudding.

Foard County

The Texas Co.'s No. 1 McCoy, drilling at 3,610 feet.

Cottle County

Woodley and others' No. 2 Dulaney, drilling at 1,400 feet.

Baylor County

Green and others' No. 1 Shelly, drilling at 1,250 feet; Magnolia Petroleum Co.'s No. 3 Portwood, 650 feet; Petroleum Production Co.'s No. 6 Mills, sand at 1,404 feet; Richards and others' No. 1 Whitworth, setting casing at 710 feet.

Clay County

Lone Star Gas Co.'s No. 17 Holloway, showing oil at 1,715 feet; No. 18 Holloway, setting casing at 1,652 feet; Atlantic Oil Production Co.'s No. 1 Scaling, fishing at 3,353 feet; Nelson and others' No. 1 Chapin, fishing at 1,132 feet.

Montague County

The Texas Co.'s No. 1 Maddox, drilling at 1,202 feet; Texhoma Oil & Refining Co.'s No. 4-A Rowland, 1,300 feet; No. 1 McGoughy, 105 feet.

Jack County

Buttram Petroleum Co.'s No. 1 Preston, drilling at 2,250 feet.

Throckmorton County

Associated Petroleum Co.'s No. 2 Putnam, drilling at 925 feet; Pandem Oil Corp.'s No. 2-A Portwood, 200 feet; Red Bank Oil Co.'s No. 1 Parrott, 2,605 feet; Reiter-Foster and others' No. 2 Stubblefield, 3,815 feet; Texhoma Oil & Refining Co.'s No. 3 Reynolds, 2,910 feet.

Haskell County

Herbert Oil Co.'s No. 1 Macon, underreaming; Kouri and others' No. 2 Ballard, drilling at 2,300 feet; Wolf and others' No. 1 Colbert, 1,660 feet; Weirt and others' No. 1 Colbert, 2,495 feet.

Stonewall County

Arkansas Fuel Oil Co.'s No. 1 Craft, underreaming; Ward and others' No. 1 Ward, drilling at 1,950 feet.

Kent County

The Texas Co.'s No. 1 Barron is spudding.

Garza County

Emerald Oil Co.'s No. 1 Connell is drilling at 1,600 feet.

Shackelford County

Carter and others' No. 1 Proctor, cleaning out at 1,681 feet; Hope Petroleum Co.'s No. 6 Reynolds, setting casing at 1,282 feet; Mahlstedt Oil Co.'s No. 1 Russ, drilling at 850 feet; Milham Oil Corp.'s No. 1 Sedwick, spudding; Phillips Petroleum Co.'s No. 1 Fry, drilling at 3,125 feet; No. 8 Lynch, 986 feet; Roeser & Pendleton's No. 1 Cook, underreaming; No. 2 Cook, fishing at 240 feet; Wells and others' No. 1 McLemone, spudding; Zeigler and others' No. 1 McKeever, setting casing at 1,510 feet.

Palo Pinto County

Jack Dalton Oil Co.'s No. 6 Dalton, fishing at 4,010 feet; Ochiltree and others' No. 1 Hinkson, drilling at 435 feet; Pender Production Co.'s No. 2 Rosmussen, fishing at 880 feet.

Callahan County

Adams and others' No. 1 Wiadham, drilling at 209 feet; Conway and others' No. 1 Thorn, 520 feet; Cranfill and others' No. 1 Smith, 1,100 feet; McCamey and others' No. 1 Block 11, 1,430 feet; Mook Texas Oil Co.'s No. 1 Baum, 600 feet; No. 4 McDonough, 1,370 feet; No. 6 McDonough, 720 feet; Nichols and others' No. 1 Block 16, 1,400 feet; Petroleum Exploration Co.'s No. 1 Smart, 1,240 feet; Riddle and others' No. 1 Block 26, 1,350 feet; Root Drilling Co.'s No. 1 Block 38, 1,420 feet; Shackelford and others' No. 1 Block 39, 1,400 feet; Weiler Brothers' No. 1 Block 32, 1,180 feet; Williams and others' No. 1 M. K. & T., 1,280 feet.

Mitchell County

Atlantic Oil Production Co.'s No. 2 Womack, showing oil at 3,075 feet; Atlantic Oil Producing Co.'s No. 3 Womack, drilling at 310 feet; Magnolia Petroleum Co.'s No. 1 Coleman, drilling at 2,610 feet; No. 1 Watson, 2,905 feet; California Co.'s No. 1 Swenson, 2,660 feet; California Co.'s No. 1 Adams, 2,505 feet; No. 15 Morrison, 1,330 feet; Eastland Oil Co.'s No. 1 Adams, 300 feet; California Co.'s No. 3 Womack, 470 feet.

Howard County

Marland Oil Co.'s No. 1 O'Daniel is fishing at 3,103 feet.

Culberson County

California Co.'s No. 1 Gresham is drilling at 3,700 feet.

Sterling County

Co-Operative Lease & Developing Co.'s No. 1 Dauthit, drilling at 1,005 feet; Harty and others' No. 1 Reynolds, setting casing at 1,205 feet; Chicago Texas Oil & Gas Co.'s No. 1 Durham, drilling at 2,365 feet; Wrightsman Petroleum Co.'s No. 1 Collins, 300 feet.

Coleman County

Bateman and others' No. 1 Morris, drilling at 890 feet; French and others' No. 1 Morris, fishing at 1,265 feet; Gilman and others' No. 1 Aston, underreaming; Magnolia Petroleum Co.'s No. 15 Morris, drilling at 380 feet; McLester Oil Co.'s No. 1 McDermitt, 2,400 feet; Merry Brothers' No. 1 McClellon, 1,030 feet; Morse Production Co.'s No. 1 McCrary, 200 feet; Sunflower Oil Co.'s No. 4 Gates, spudding; Texas Pacific Coal & Oil Co.'s No. 1 Powell, drilling at 2,120 feet; Wright and others' No. 1 Hutchings, 1,000 feet; Cranfill and others' No. 1 Kingsbury, 894 feet; Howard Petroleum Co.'s No. 1 Stearns, spudding.

Tom Green County

Bryant and others' No. 1 Llano County, spudding; Church and others' No. 1 Williams, underreaming; Roxana Petroleum Corp.'s No. 1 Clark, drilling at 1,250 feet.

Irion County

Oklavania Oil Co.'s No. 1 Sawyer setting casing at 520 feet.

Upton County

Independent Oil & Gas Co.'s No. Burleson, drilling at 455 feet; German and others' No. 1 Halff, cleaning out at 650 feet; Kirby Petroleum Co.'s No. Union Land, drilling at 2,500 feet; Plateau Oil Co.'s No. 1 Union Land, 6 feet; Willys and others' No. 1 University, 2,345 feet.

Crane County

Penn-Tex Developing Co.'s No. 1 Co den, drilling at 2,100 feet; Texas Dev oping Co.'s No. 1 Cowden, 3,595 feet.

Reeves County

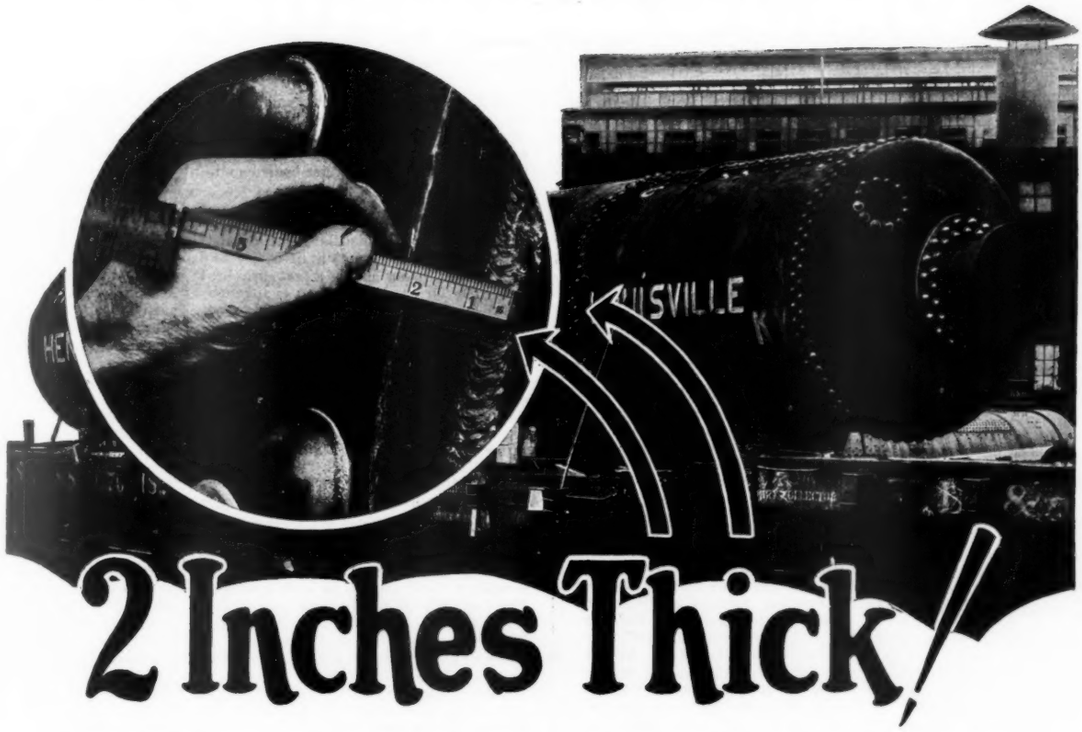
World Oil Co.'s No. 1 Kloh is drilli at 1,005 feet.

BARNSDALL CORP. GETS WAITE PHILLIPS C

(Continued from Page 31)

period of five years, ending December 1 1930.

In connection with this financing a nouncement is also made stockholders the Barnsdall Corp. will be entitled subscribe to new class A stock in amou equal to approximately 25 per cent present holdings. This stock offering h been underwritten by a group headed Blair & Co. It is estimated in some qu ters additional companies will come und the Barnsdall consolidation, includi Simms Petroleum Co.



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Lubricants From Mixed Base Crudes

Investigation Discloses Economical Method of Manufacturing Lubricating Oils From Pressed Distillates Secured From Several Types of Crude

By H. L. Kauffman
Chief Chemist, Producers & Refiners Corp., Parco, Wyo.

In general, there are three main types of crude petroleum. These are designated as paraffin base, asphalt base and mixed base. This method of description refers in a qualitative way to the chemical composition of crude oil. Crudes are said to be paraffin base, when they are composed largely of paraffin hydrocarbons and contain little or no asphalt. Asphaltic base crudes are so-called because they contain a large amount of asphalt and few or not any paraffin hydrocarbons, such as those represented by the solid waxes. Mixed base crudes contain both paraffin wax and other hydrocarbons of the paraffin series, as well as asphalt. This type of crude is of a character intermediary between that of a paraffin base crude and an asphaltic base crude.

In discussing the methods of manufacturing any article, first consideration should be given to the raw material used. It is interesting to note that lubricating oils of some kind can be made from nearly all crude petroleum oils. However, it also should be remembered that not all crudes will yield lubricants of good quality or in sufficient quantity to warrant processing the crude for their recovery.

At the present time (and it appears that there will also be for years to come) there is almost an unlimited supply of raw material from which lubricating oils can be obtained. It has been estimated that not over 25 per cent of the crude oil containing lubricating oils, refined in the United States, is processed for lubricants. Oil that is now being sold as fuel oil, and as such is being burned under boilers and in the heavier types of internal combustion engines, contains large percentages of valuable lubricating oils and wax. In other words, from four to six times as much oil and wax as is now being manufactured could be made, if there was sufficient market demand for these products. Although, without due consideration to all the facts, this may appear to be an ecomonic waste, in reality, it is not a waste. The growth of the automotive industry has made gasoline the major product resulting from the refining of crude petroleum. The development of cracking processes has increased the percentage yield of gasoline that it is possible to obtain from any crude oil. Hence, today, in order to meet the gasoline requirements of the world, there is only about one-half as much crude oil being produced and refined as would be necessary if the yield of gasoline per barrel of crude were no greater than 15 years ago. Consequently there is a much smaller proportion of potential lubricating oil being burned as fuel oil, at the present time, than was formerly the case.

Not All Manufacturing

The refining of crude oil to produce lubricating oils is not entirely a manufacturing process. This is because crude oil is a mixture of different compounds or hydrocarbons in a pure state plus certain other compounds or complex hydrocarbons, which, because of their characteristics and the fact that their presence in the finished product is detrimental thereto, may be classed as impurities. The problem of the refiner, therefore, involves the separation of these products or compounds from each other and thereafter removing the impurities, by various refining methods, from the separated components of the crude.

For the most part, the liquid products are separated from each other by distillation, the application of heat being the principal agent by which separation is accomplished. The impurities and objectionable asphaltic constituents are partially segregated into the heavier distillates and residues, as an incidental effect of distillation, and are finally removed by chemical treatment and filtration. In the manufacture of lubricating oils from paraffin or mixed base crude oils, the waxes are separated from the oil by processes involving either filter pressing or centrifuging, after the oil has been chilled by artificial refrigeration in order to solidify the wax.

Distillation is the first and most important step in the refining operation.

FIRST ARTICLE

The accompanying article is the first of two discussions dealing with the manufacture of lubricating oils from mixed base crude oils. In the first article mention is made of the types of petroleum with a brief description of the several operating procedures in manufacturing lubricating oils. The writer then discusses the various methods of running pressed distillate to make different products. Both articles contain cost and yield data.

The data are based on the general methods followed at one refinery in investigating actual and proposed operating practices involving not only the costs and yield data, but also the physical characteristics of the products made by the various methods. The author explains that it is not to be inferred that the conclusions drawn from this investigation as to the most economical operating procedure to be followed are equally applicable to all refineries, since each refiner has particular conditions of operation which are different from those encountered by other refiners. These conclusions are to be taken as an indication only of what might prove to be either an economical operating practice in other refineries or suggestive as to whether or not a detailed study of conditions and the cost of making lubricating oils by various methods would be worth while.

This is carried out, usually, in the conventional type of horizontal, shell still; or, sometimes, the lighter products are removed from the crude in especially designed tube or pipe stills. In distilling paraffin or mixed base crudes in a horizontal, shell still, gasoline, naphtha, kerosene, gas oil and wax distillate are the main products removed from the crude as distillates, leaving in the still a residual oil, which is sold either as cylinder stock or fuel oil; or, if the crude originally contained a relatively low percentage of asphaltic constituents, the cylinder stock bottoms may be further refined to produce various, marketable grades of either filtered cylinder stocks or bright stocks. From asphalt base crudes are obtained naphtha (occasionally gasoline from some crudes), kerosene, gas oil and lubricating distillates as overhead distillates, leaving a residual product in the still that may be either fuel oil, road oil, or coke, depending upon the extent and the manner of the reduction.

Refineries operating on either paraffin or mixed base crudes refine the wax distillate cut from the crude for lighter-bodied lubricating oils (spindle oils, turbine and engine oils, up to and including grades of oil comparable to light and medium motor oils); while the residual oil, if desired, may be further refined to produce the heavier-bodied cylinder and bright stocks.

Wax Distillate

In most cases the first step in the refining of the wax distillate cut consists in rerunning this fraction in a fire and steam still, using much direct fire heat and little steam, in order to change (by heat) the character of the paraffin wax, which is present in the wax distillate cut from the amorphous (mushy) to the crystalline condition. In this latter state the paraffin wax is removed from the oil with less difficulty in subsequent operations. This process of changing the physical characteristics of the wax contained in the wax distillate fraction by redistillation is known as "cracking" the wax distillate.

It is not always necessary to crack all of the wax distillate cut from a crude, since, from most crudes, there is obtained a certain portion of so-called "raw" wax distillate in which the paraffin wax is already present therein in such a crystalline form that it can be readily separated from the oil by chilling and pressing. This raw wax distillate may either be processed separately for a maximum yield of lubricating oils, or it may be blended with cracked wax distillate, and the whole then processed for the manufacture of lubricating oils.

The processing steps thereafter differ in various refineries. Many refiners give the wax distillate a chemical treatment in agitators, applying sulphuric acid to the oil in order to remove asphaltic constituents, and then neutralizing the treated oil with a solution of either caustic soda or soda ash, and afterwards thoroughly washing the neutralized oil with hot water until the oil is free from alkali. Refiners who have adopted this operating procedure are of the opinion that such a chemical treatment is an aid, subsequently to the more ready separation of the oil from the wax by cold pressing, and facilitates the sweating operations involved in the refining of the paraffin wax. Other refiners, who do not give the wax distillate a chemical treatment, maintain that such a treatment is unnecessary and inefficient, and that equally as good results can be obtained, without treatment, by careful laboratory control of the wax distillate (uniformity in the physical characteristics of this cut is essential to successful operation) and by particular attention to temperatures and methods of sweating the paraffin wax. In the writer's opinion, whether or not it is either advantageous or necessary to treat the wax distillate will depend upon the characteristics of the crude from which the wax distillate was obtained (that is, whether or not, because of the nature of the crude, the wax distillate contains asphaltic constituents in such quantities as to interfere with later processing operations); and upon practical conditions within the plant itstlf.

Removing Wax

To remove the wax, the wax distillate is cooled to a low temperature by artificial refrigeration in especially designed "chillers," and in this chilled condition it is then pumped to a wax filter press, under high pressure, where the wax distillate is separated into so-called "slack" wax and pressed lubricating distillate. If necessary, the slack wax is acid treated and neutralized, after which, by a series of sweating operations, it is refined until pure, hard wax results. Usually, the hard wax is filtered through fullers earth as the final step in the refining of the wax. The pressed distillate is rerun in fire stills, using both fire and steam as the source of heat, and the lighter distillates removed therefrom. Lubricating oils obtained from the pressed distillate are usually given an acid treatment followed by neutralization, unless, as in the case of many oils from pure paraffin base crudes (such as many of the Pennsylvania oils), the character of the oil is such that an acid treatment is not necessary. The treated oil may be sold as such (after the moisture has been removed in bleaching tanks) for purposes where a very highly refined oil is not essential; or, as is most often the case, the oil may be filtered through fullers earth as the final step in refining. Oils that it is not necessary to treat with sulphuric acid are also usually filtered through fullers earth as the final step. From the filters, these oils of different viscosities, varying from a very light body to a medium body, are pumped to the finished lubricating oil storage tanks.

A method of processing crude oil that is followed by some refiners is to "top" the crude (that is, remove all gasoline, naphtha, kerosene and about one-half of the gas oil from the crude), leaving a residual product in the still known as "topped" crude. This topped crude is then acid treated and afterwards neutralized with either ammonia or a solution of either caustic soda or soda ash, being very careful to avoid excessive emulsification of the oil during the process of neutralization and washing. The treated oil is then rerun, and cuts made therefrom for rerun distillate, kerosene distillate, gas oil and wax distillate (sometimes wax slop, also, depending upon the extent of the reduction) leaving a cylinder stock bottoms in the still.

The residual oil may be sold as a steam-refined cylinder stock, if it will flow from a container at average room temperature (that is, if it has a cold or solidification point of not over 75 degrees Fahrenheit). Or, without any chemical treatment, it may be filtered through fullers earth, after which it may be sold as a filtered cylinder stock. Filtration through fullers earth may take place either with or without a previous dilution of the heavy stock with either gasoline or naphtha. If the oil is filtered in the diluted stage, and separation of the wax from the oil is not necessary, the diluted, filtered oil must be rerun again to remove the naptha before the product can be sold as a filtered cylinder stock.

Bright Stocks

If either bright stock or a low cold test filtered cylinder oil is desired, the wax is removed from the filtered solution of the cylinder stock either by "cold settling" or by removing the wax from the chilled oil centrifugally. In the former case, the wax, being heavier than the naphtha solution of the oil, falls by gravity to the bottom of an insulated tank, which is fitted with cooling coils for artificial refrigeration, and by means of which the diluted oil is slowly cooled to a low temperature. This separation of wax, or petrolatum, by which name it is more commonly known, has the effect of lowering the cold test of the stock that results from the reduction of the naphtha solution of oil pumped out of the cold settling tank from a point above the level at which the amorphous wax first shows. Similar results are obtained, more efficiently and at a lesser cost, by centrifuging the suspended, amorphous wax from the chilled, naphtha solution of the stock, as a result of which

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process amorphous wax and diluted, wax-free oil likewise are obtained.

Regardless of the procedure followed in separating the wax from the oil, this amorphous wax contains blending naphtha, which is separated from the wax by a redistillation in either steam stills or in fire and steam stills. Usually, this naphtha-free petroleum is blended with the charging stock to the refineries' pressure stills, and thus gasoline, eventually, is made from the petroleum. This is done because there is little market demand for either filtered petrolatums or "vaseline," which latter is made by blending light-colored (highly filtered) petroleum with lubricating oils of low viscosity in the proportions necessary to give the desired consistency to the vaseline.

Cylinder stocks from some crudes are of such a character that it is possible to remove the wax satisfactorily from the dilute solution of the untreated and unfiltered oil, and thereafter treat and filter the same to the color desired. This lessens the cost of filtration, since there is no wasteful expenditure of either time or material in declorizing 12 to 18 per cent of less valuable wax present in the average cylinder stock, and which, in such cases, is removed from the oil prior to filtration.

Cylinder Stocks

To produce cylinder and bright stocks from all mixed base crudes refined for lubricating oils, and also some paraffin base crudes, a chemical treatment of the residual oil from the still usually is necessary in order to remove objectionable asphaltic constituents. Treatment of the oil with sulphuric acid, followed by neutralization with an alikali, is the common procedure. After treatment, the general practice is to filter the stock before separating the amorphous wax.

Oils manufactured from the lubricating distillates of either paraffin or mixed base crude oils are usually not heavy enough to be sold as a grade of oil comparable to the average heavy or extra heavy grade of motor oil. It is therefore necessary to blend these filtered "straight run" lubricating oils with highly filtered, low cold test cylinder stock (bright stock) of extremely heavy body in the proportions necessary to produce heavy and extra heavy grades of oil, such as would be required for the proper lubrication of some type of internal combustion engines.

Lubricating oils of various viscosities are made from the lubricating distillate cuts of asphalt base crude oils by processes involving distillation, chemical treatment (usually a treatment of the oil with sulphuric acid followed by neutralization with an alkali), and filtration through fullers earth. The finished oils either may be sold as such, or they may be blended with heavy cylinder stocks to produce various grades of marketable oils.

Running Pressed Distillate

Refinery processing operations involved in the manufacture of lubricating oils from paraffin-containing crude oils have been discussed in a general way in preceding paragraphs, so that the reader will have in mind a broad idea of conventional practices followed in the manufacture of lubricating oils as a whole, and, therefore, will be able to understand more readily the detailed discussion that will follow on economical operating practice relating to one phase only of lubricating oil manufacture—namely, the production of lubricating oils from pressed distillate.

Pressed distillate, it has been mentioned, is the name applied to the wax-free oil resulting from the cold pressing of the wax distillate cut from the crude, and is the source of most of the lighter-bodied lubricating oils.

Different methods of making the cuts off the pressed distillate are in use in various refineries. Cuts are always made for either benzine (crude naphtha) or rerun distillate, or both, and gas oil. A total of, approximately, 40 per cent of lighter distillates and gas oil are thus obtained from the distillation of pressed distillate. The number of different lubricating cuts, and the points at which such cuts are made, are varied in each refinery. The procedure followed depends upon what the process superintendent deems advisable in order to obtain the maximum yield of the products desired at the lowest operating expense, and in order to suit practical conditions of operation within the plant itself.

One method of making the cuts is as follows:

"Over" to 50.°* stream gravity	Crude naphtha
50.0° to 38.0° stream gravity	rerun distillate
38.0° to 30.5° stream gravity	Gas oil
30.5° to "off"	"30" pale distillate

*Some refiners follow the practice of cutting from "over" to 45° stream gravity into crude naphtha, in which case from 45° to 38° stream gravity is cut into rerun distillate.

Residual Oil

The residual oil is of such viscosity that, after acid treatment and filtration, an oil will result that may be either 150, 160, 180, 200, 220, 240, 250, 260, 280 or 300 viscosity at 100 degrees Fahrenheit, this depending upon previous experience on the part of the refiner as to the viscosity desired on a finished oil, the manufacture of which is most economical and which can be disposed of to greatest advantage, and upon practical conditions within the plant itself. Usually, the oil is reduced in the still to a viscosity 7 to 10 per cent higher than the viscosity desired on the treated oil. For example, a residual oil from the reduction of pressed distillate having a viscosity of 172 at 100 degrees Fahrenheit, will "finish up" at about 160 viscosity; one of 270 viscosity will yield a finished oil of 250 viscosity; while 330 viscosity residual oil will produce a 300 viscosity treated and filtered oil. These refer only to lubricating oils made from pressed distillate obtained from the refining of a mixed base crude oil. In general, the more viscous the residual oil, the larger is the percentage decrease in viscosity of the finished oil. Acid treatment and filtration always decrease the viscosity of an oil, the percentage fall in viscosity being greater, the more viscous the oil.

When cuts are made on the pressed distillate in the manner outlined above, the "30" pale distillate is then rerun by a fire and steam distillation, using much steam, and making cuts of the overhead distillate for gas oil and "30" and "28" pale oils, while the oil remaining in the still is known as "25" pale oil.

Another method is to make three different cuts of the overhead lubricating distil'ate, as follows:

31.5° to 29.0° stream gravity	30 pale distillate
29.0° to 27.0° stream gravity	28 pale distillate
27.0° to "off"	25 pale distillate

These different cuts are then brought back separately to the still, where they are reduced to the proper flash and viscosity test.

Other Methods

Still another method is to make cuts for 30 and 25 pale distillates in the distillation of the pressed distillate. The 30 pale distillate is then reduced to 28 pale oil—gas oil and 30 pale oil resulting from this distillation. To obtain the proper flash and viscosity test, the 25 pale distillate is returned to the still, there being reduced with fire and steam until physical tests show that the residual oil is at the point desired.

A fourth method is to make cuts for 30 and 28 pale distillate, and to reduce the former to a 28 pale oil, taking 30 pale oil off overhead as a distillate; and to reduce the latter to 25 pale oil, making a cut from the overhead distillate for 28 pale oil.

Various other methods of making the cuts are possible, but it will depend upon the process superintendent, with the aid of the laboratory, to determine just which methods are best. The lab-

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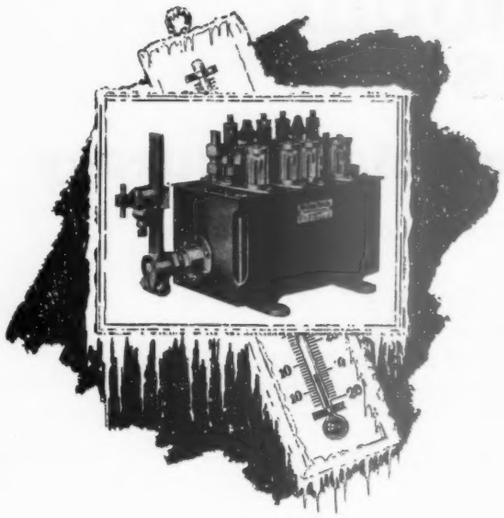

WHEN the thermometer drops to zero and the oil in the pipe lines congeals, it is human nature to forget the usual oiling or to neglect to give it the added attention required at this time. The result is that scored cylinders and frozen bearings prevail, tying up production.

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oratory plays an important part in controlling all the distillations involved in the manufacture of lubricanting oils, for, in addition to the gravity of the stream, which the stillman takes, viscosity, flash and fire tests are taken at regular intervals in the laboratory to aid in determining the point at which the various cuts shall be made.

These various viscous and nonviscous oils are transferred to the agitators, where they are treated with sulphuric acid, neutralized in a second agitator with a solution of either caustic soda or soda ash, washed with water, and then pumped into bleachers where the moisture is removed, and the oil thus brightened. Some of these different oils are sold under various trade names without any additional refining, but, usually, as has been previously mentioned, for the final refining process these oils are filtered through fullers earth for the purpose of improving their color and removing any objectionable impurities.

As the finished oils are placed on the market, 30 pale oil has a viscosity of about 70 at 100 degrees Fahrenheit; 28 pale oil, a viscosity of about 100 at 100 degrees Fahrenheit; while 25 pale oil is a viscous neutral oil having a viscosity of about 150 at 100 degrees Fahrenheit.

Comparison of Methods

In the discussion and table that will follow will be given the detailed results of an investigation made at one refinery to ascertain the most economical method of manufacturing various grades of lubricating oils from pressed distillate, making the study both from the viewpoint of the cost of manufacture and the quality of the products made thereby. Primary interest in this investigation relates to the manufacture of both viscous and nonviscous oils by blending both lighter and heavier oils with a treated and filtered oil made from pressed distillate, the original viscosity of which oil before either acid treatment or filtration was 180 seconds at 100 degrees Fahrenheit; and a comparison of the yield, cost and quality of viscous and nonviscous oils made in such a manner with oils of similar physical tests made by the straight reduction of pressed distillate to 270 and 330 viscosity bottoms, in this case the nonviscous oils being made by the subsequent reduction of the overhead lubricating distillates resulting from the distillation of the pressed distillate in a manner similar to the methods that previously have been described.

General Procedure

Pressed distillate was reduced in a plant still to bottoms having a viscosity of 180 seconds at 100 degrees Fahrenheit on the Saybolt Standard Universal viscosimeter. A sufficient quantity of this 180 viscosity stock was obtained for subsequent experimental tests. Careful gauges were taken on the run-down tanks and on the still to determine the percentage yield of the various products distilled overhead and of the residual oil.

The 180 viscosity stock was treated in a laboratory agitator with 15 pounds per barrel of 66 degree sulphuric acid and then neutralized with a solution of caustic soda. The resultant oil was 3½ to 4 N.P.A. color and, subsequently, was blended with 30 pale oil treated, (75 at 100 viscosity) to make 28 pale oil treated, (100 at 100 viscosity); and with the same 30 pale oil to make 25 pale oil, treated (150 at 100 viscosity). The treated 180 viscosity stock (172 at 100 viscosity after treatment) was also blended with 30 pale oil, treated, and a special treated cylinder stock (150 at 210 viscosity) to make a treated oil having a viscosity of 160 seconds at 100 degrees Fahrenheit; also, with bright stock to make a 200 viscosity treated, red oil; and with a larger percentage of bright stock to make a 250 viscosity, treated, red oil; and with even a larger percentage of bright stock to make a 300 viscosity, treated, red oil.

A portion of the treated 180 viscosity stock was filtered through fullers earth in a laboratory filter to a 2 N.P.A. color. The filtered oil had a viscosity of 167 at 100 degrees Fahrenhit and was used with 30 pale oil, filtered, to make 28 and 25 pale oils, filtered; with 250 viscosity red oil, filtered, to make an oil having a viscosity of 180 seconds at 100 degrees Fahrenheit; and with bright stock to make 250 and 300 red oils, filtered.

After the sample of 180 viscosity stock had been taken from the plant still that was running on pressed distillate, distillation was continued until the residual oil was 270 viscosity at 100 degrees Fahrenheit. (250 at 100 degrees Fahrenheit, after acid treatment and filtration), at which point a sample of sufficient size for subsequent experimental tests was taken from the still. At this time, also, careful gauges again were taken on the run-down tanks and on the still, so that an accurate percentage yield of overhead distillate and residual oil, calculated back to the original pressed distillate, could be obtained.

Having obtained the sample of 270 viscosity oil, distillation was continued until the residual oil was 330 viscosity at 100 degrees Fahrenheit (300 viscosity after acid treatment and filtration). Plant yields of overhead distillate and 330 viscosity stock, calculated back to the original pressed distillate, were obtained at the conclusion of the test run.

This article will summarize the results of a comparison of the products obtained by the methods outlined above from the viewpoint of costs, yields and the physical tests on the oils made by the different methods. A comparison also will be drawn between viscous filtered oils (250 and 300 viscosity oils), prepared by these methods, with oils made by different refiners from a similar type of crude, but concerning which no information was available as to the operating procedure followed in their manufacture. Only oils of similar viscosity sold by different refiners for use in internal combustion engines will be compared.

Comparison of Yields

Table I shows a comparison of the plant yields obtained when reducing pressed distillate to a point where the residual oil was 179 viscosity at 100 degrees Fahrenheit, 270 viscosity at 100 degrees Fahrenheit and 330 viscosity at 100 degrees Fahrenheit. From these stocks were obtained, after acid treatment and filtration, oils having a viscosity of 167 seconds, 249 seconds and 301 seconds at 100 degrees Fahrenheit, respectively.

These percentages represent the yields obtained when cuts are made from the pressed distillate in the following manner:

"Over" to 45° stream gravity	Benzine (crude naphtha)
45.0° to 37.0° stream gravity	Rerun distillate
37.9° to 30.5° stream gravity	Gas oil.
30.5° to 28.7° stream gravity	"28" pale distillate
28.7° to "off"	"25" pale distillate

In obtaining the 180 viscosity bottoms, the residual oil was at, approximately, this point when the gravity of the overhead distillate was 28.7 degrees A.P.I. Hence, in this case, no cut was made for 25 pale distillate, this cut being obtained only when reducing to a more viscous bottoms.

The percentage yields are based on a charge to a plant still of 951.5 bbls. of pressed distillate.

TABLE I
Comparison of Yields From Pressed Distillate When Reducing to Bottoms of Different Viscosities.

Product—	Number of 42-gallon barrels obtained when pressed distillate has been reduced to bottoms of			Percentage yield obtained when pressed distillate has been reduced to bottoms of		
	179/100 Vis.	270/100 Vis.	330/100 Vis.	179/100 Vis.	270/100 Vis.	330/100 Vis.
Benzine	21	21	.....	2	2	2
Rerun distillate	17	17	.....	2	2	2

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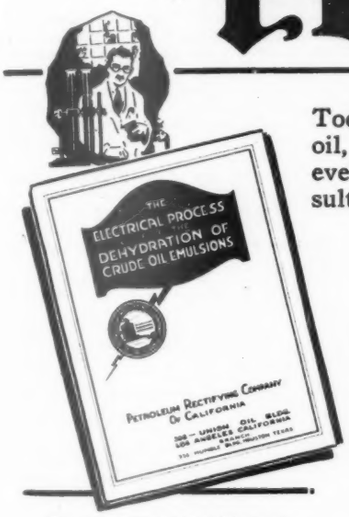

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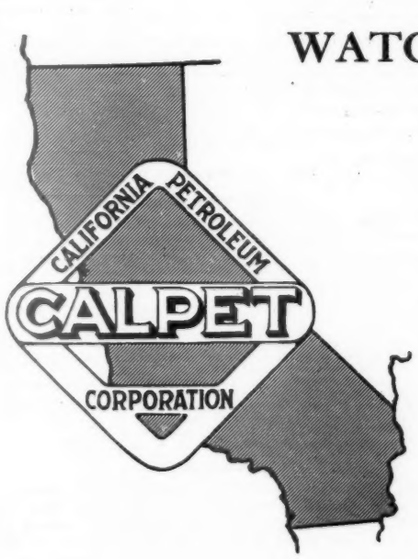

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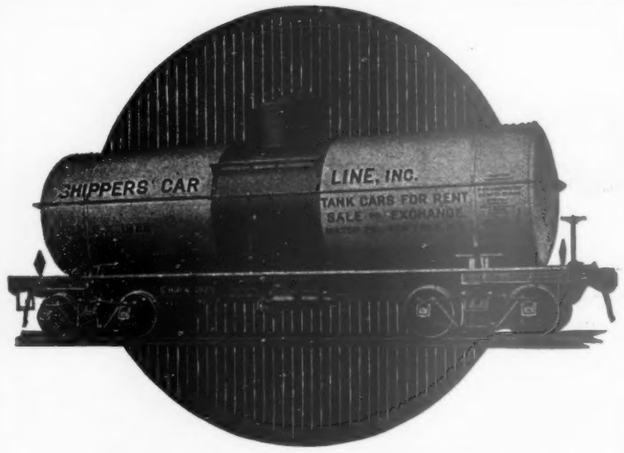

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Gas oil	210	319	.....	33	33	33
28 pale distillate	193	193	.....	21	21	21
25 pale distillate	.....	144	.....	...	15	15
179 viscosity bottoms	393	.....	.....	41	...	...
270 viscosity bottoms	.....	248	.....	...	26	...
330 viscosity bottoms	.....	.....	.....	...	...	25
Loss on distillation (approx.)	9.5	9.5	.....	1	1	1
Total	951.5	951.5	.....	100	100	100

The percentage yield of 330 viscosity bottoms shown in the average yield of bottoms obtained by the reduction in the plant of three different batches of pressed distillate on two consecutive days.

Cost of Treating

The conventional practice in the operation of the refinery under discussion, prior to this investigation, had been to reduce the pressed distillate to 270 viscosity bottoms, this residual oil "finishing up" with a viscosity of 250 at 100 degrees Fahrenheit, after acid treatment at filtration.

The average plant value of the 270 viscosity oil was approximately 7 cents per gallon ($2.92 per barrel). The average plant cost of acid treatment was 1 cent per gallon ($0.425 per barrel of treated oil); while the average plant cost of filtering through a column of coarse mesh fullers earth to a 3½ to 4 N.P.A. color was 0.89 cents per gallon ($0.374 per barrel).

Such data, however, were not available as to the cost of acid treating and filtering 180 and 330 viscosity oils. Similar information concerning these oils, therefore, was obtained by using as a basis the results of laboratory experimental treating and filtration tests.

180 Viscosity Oil

Tests on the Untreated Oil.

Flash	Fire	Pour Test	Viscosity 100° F.	Color
380	440	20	179	160 on Lovibond ¼-inch cell

Acid Treatment.

Gravity of acid used	66° Baume
Acidity of acid used	93.1%
Amount of acid used	15 pounds per barrel
Temperature at which oil was treated	120° Fahrenheit
Loss of oil on acid treatment	4.9%

Tests on the Treated Oil.

Gravity	Fash	Fire	Pour Test	Viscosity at 100°F.	Color
27.0	380	435	25	172	3½ to 4 N.P.A.

Cost of Acid Treatment of 100 Bbls. of 180 Viscosity Oil.	
15 pounds per barrel of sulphuric acid, at 1¼ cents per pound	$18.75
Chemical used for neutralization	1.10
All other charges, including labor, steam, water, air, slude disposal fixed charges, etc.	35.55
Based on 5% loss of oil as slude, 95 bbls. of treated oil therefore would be recovered, which would cost	$55.40
Cost of acid treatment per barrel of treated oil	0.583
Cost of acid treatment per barrel of finished oil	$0.595

Filtration

The treated oil, which now showed a viscosity of 172 seconds at 100 degrees Fahrenheit, was filtered through fullers earth in a laboratory filter until the resultant oil was 2 N.P.A. color. Data were obtained as to the yield of oil of this color that would be obtained in the same plant from a ton of clay of the same quality as was used in making the laboratory filtration tests. The loss of oil in the clay was assumed to be 2.0 per cent, this being a fair average of the per cent of oil lost in the plant when filtering a similar grade of oil on a commercial scale.

Tests on the Filtered Oil.

Gravity	Flash	Fire	Pour Test	Viscosity at 100°F.	Color
27.8	380	435	25	167	2 N.P.A.

Cost of acid treatment per barrel of finished oil	0.595
All charges, including clay costs, labor, steam, air, naphtha loss in washing filter, fixed charges, etc.	$32.02
Based on loss of 2% of oil in clay, 93.1 bbls. of filtered oil would be recovered, which would cost	32.02
Cost of filtration per barrel of filtered oil	0.344
Total Manufacturing Cost of 167 Viscosity Oil.	
100 bbls. of 180 viscosity stock at $2.32 per barrel	$232.00
Labor, material and fixed charges expended is acid treatment of 100 bbls. of 180 viscosity stock	55.40
Labor, material ani fixed charges expenied in filtration of 95 bbls. of 172 viscosity oil	32.02
Number of barrels of filtered oil recovered	93.1
Total manufacturing cost of obtaining 93.1 bbls. of treated and filtered 167 viscosity oil	$319.42
Manufacturing cost per barrel of 167 viscosity oil	3.431

The cost, $3.431, for 167 viscosity oil can be checked in the following way:

Value per barrel of untreated 180 viscosity oil	$2.32
Value per barrel of untreated oil in finished oil—$2.32 divided by 93.1 (per cent recovery)	2.492
Cost of acid treatment per barrel of finished oil	0.595
Cost of filtration per barrel of finished oil	0.344
Manufacturing cost per barrel of 167 viscosity oil	$3.431

330 Viscosity Oil

Tests on the Untreated Oil.

Flash	Fire	Pour Test	Solidification Point	Viscosity at 100°F.
420	490	20	19	330

Acid Treatment

As in the case of the acid treatment of the 180 viscosity oil, 66 degrees Baume sulphuric acid containing 93.1 per cent acid was used in treating this oil.

Amount of acid used	12 pounds per barrel
Temperature at which oil was treated	130°F.
Loss of oil on acid treatment	12.0%

Tests on the Treated Oil.

Gravity	Flash	Fire	Pour Test	Solidification Point	Viscosity at 100°F.	Color
26.3	420	490	25	23	310	5½ N.P.A.

Cost of Acid Treatment of 100 Bbls. of 330 Viscosity Oil.	
12 pounds per barrel of sulphuric acid at 1¼ cents per pound	$15.00
Chemical used for neutralization	1.10
All other charges, including labor, steam, water, air, sludge disposal, fixed charges, etc.	35.55
Based on 12% loss of oil as sludge, 88 bbls. of treated oil therefore would be recovered, which would cost	$51.65
Cost of acid treatment per barrel of treated oil	0.587
Cost of acid treatment per barrel of finished oil	0.599

Filtration

The treated oil, which now showed a viscosity of 310 seconds at 100 degrees Fahrenheit, was filtered through fullers earth in a laboratory filter until the resultant oil was about 5 N.P.A. color. Data also were obtained in making this experimental filtration test as to the yield of oil of this color that would be obtained in the plant from a ton of clay of the same quality as was used in making the tests in the laboratory. Here, again, the loss of oil in the clay was assumed to be 2.0 per cent.

Tests on the Filtered Oil

Gravity	Flash	Fire	Pour Test	Solidification Point	Viscosity at 100°F.	Color
26.6	420	495	30	25	301	5 N.P.A.

Cost of Filtration of 88 Bbls. of 310 Viscosity Oil.	
All charges, including clay costs, labor, steam, air, naphtha loss in washing filter, fixed charges, etc.	$32.46
Based on loss of 2% of oil in clay, 86.24 barrels of filtered oil would be recovered, which would cost	$32.46
Cost of filtration per barrel of filtered oil	0.376
Total Manufacturing Cost of 300 Viscosity Oil.	
100 bbls. of 330 viscosity oil at $3.35 per barrel	$335.00
Labor, material and fixed charges expended in acid treatment of	

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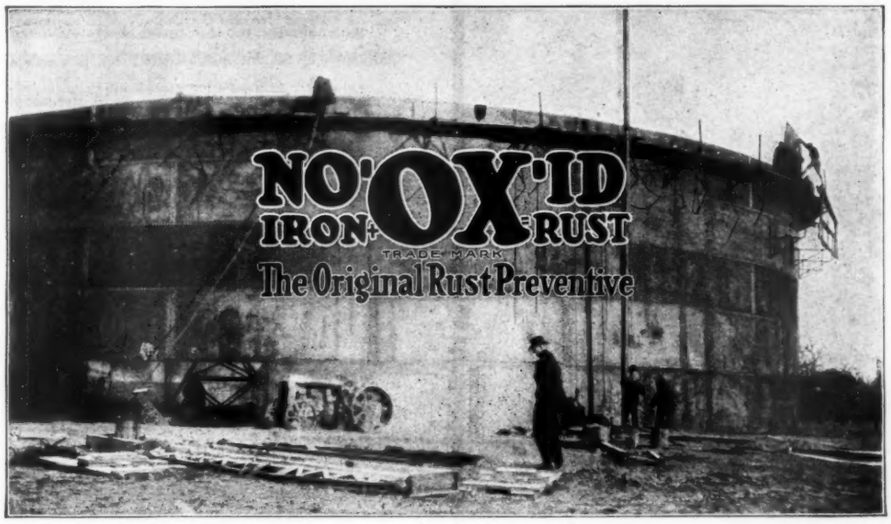

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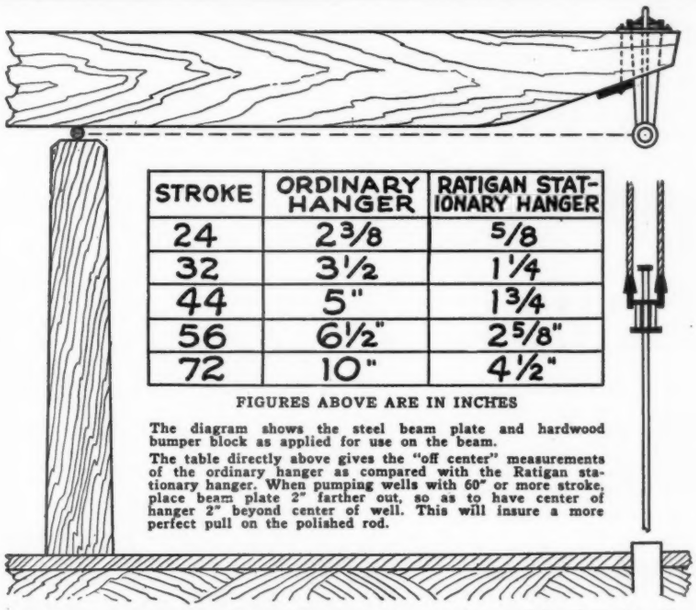

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24	2 3/8	5/8
32	3 1/2	1 1/4
44	5"	1 3/4
56	6 1/2"	2 5/8"
72	10"	4 1/2"

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The diagram shows the steel beam plate and hardwood bumper block as applied for use on the beam.

The table directly above gives the "off center" measurements of the ordinary hanger as compared with the Ratigan stationary hanger. When pumping wells with 60" or more stroke, place beam plate 2" farther out, so as to have center of hanger 2" beyond center of well. This will insure a more perfect pull on the polished rod.

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No. 1-A Hanger with Adapter fitting and No. 6 Polish Rod Grip

100 bbls. of 330 viscosity oil	51.65
Labor, material and fixed charges expended in filtration of 88 bbls. of 310 viscosity oil	32.46
Number of barrels of filtered oil recovered	86.24
Total manufacturing cost of obtaining 86.24 bbls. of treated and filtered 300 viscosity oil	$419.11
Manufacturing cost per barrel of 300 viscosity oil	4.86

This cost, $4.86, for 300 viscosity oil, also can be checked in the following way:

Value per barrel of untreated oil	$3.35
Value per barrel of untreated oil in finished oil—$3.35 divided by 86.25 (per cent recovery)	3.885
Cost of acid treatment per barrel of finished oil	0.599
Cost of filtration per barrel of finished oil	0.376
Manufacturing cost per barrel of 300 viscosity oil	$4.86

Results of Blending Tests

Before any accurate and comparative cost or yield data relating to plant operation could be obtained, it was first necessary to know the percentages in which it was necessary to blend the 172 viscosity treated oil—167 viscosity filtered oil—(179 viscosity before either acid treatment of filtration) with various other treated and filtered oils in order to produce oils of similar tests to those made in a manner which, prior to the time of the investigation, had been conventional plant practice.

Table II gives in tabular form the physical tests on most of the various oils used in making the experimental blends.

TABLE II

Physical Tests on Different Oils Used in Making Experimental Blends

Tests—	180 Viscosity Stock Untd.	Treated	Treated and Filtered	Bright Stock	Special Treated Cylinder Stock	30 Pale Oil Treated	30 Pale Oil T't'd and F'l't'd
Gravity °A.P.I.	...	27.0	27.8	24.8	23.6	30.0	30.1
Flash °F.	330	380	380	505	515	320	320
Fire °F.	440	435	435	575	590	380	380
Viscosity at 100°F.	179	172	167	135 at 210°F.	149 at 210°F.	75	74
Pour Test	20	25	25	40	90	20	25
Solidification Point	17	20	20	36	86	18	20
Color N.P.A.	...	3½ to 4	2	..	..	2½ to 3	1½
Color-Lovibond ½-inch cell	160	...	...	220	300	...	...

Table III shows the percentages in which these oils were blended to obtain blended oils of the viscosities indicated.

TABLE III

Data on Blending Oils Mentioned in Table II to Produce Oils of Viscosities Indicated

	Per Cent of Each Oil in Blend	Blended in Proportions Indicated Makes: 28 Pale Oil Ftd.	28 Pale Oil Ftd.	25 Pale Oil Ftd.	25 Pale Oil Ftd.	160 Vis. Oil Ftd.	180 Vis. Oil Ftd.	200 Vis. Oil Ftd.	250 Vis. Oil Ftd.	250 Vis. Oil Ftd.	300 Vis. Oil Ftd.	300 Vis. Oil Ftd.
		Viscosity at 100 Degrees Fahrenheit										
180 Vis. Treated Oil (actual Vis. 172 at 100°F.	43	103	...	...	...	...	...	...	...	...	...	...
30 pale oil, trtd.	57	...	...	...	...	...	...	...	...	...	...	...
180 Vis. Filtered Oil (actual vis 167 at 100°F)	43	...	104	...	...	...	...	...	...	...	...	...
30 pale oil, Filtered	57	...	...	...	...	...	...	...	...	...	...	...
180 Vis. Treated Oil (actual Vis. 172 at 100°F.)	16	...	...	153	...	...	...	...	...	...	...	...
30 pale oil, Treated	84	...	...	...	...	...	...	...	...	...	...	...
180 Vis. Filtered Oil (actual Vis. 167 at 100°F.	16	...	...	...	153	...	...	...	...	...	...	...
30 pale oil, Filtered	84	...	...	...	...	...	...	...	...	...	...	...
180 Vis. Treated Oil (actual Vis. 172 at 100°F.)	80.6	...	...	...	...	162	...	...	...	...	...	...
30 pale oil, Treated Special Treated Cylinder Stock	15.4	...	...	...	...	...	...	...	...	...	...	...
	4.0	...	...	...	...	...	...	...	...	...	...	...
180 Vis. Filtered Oil (actual Vis. 167 at 100°F.)	90	...	...	...	...	...	178	...	...	...	...	...
20 Vis. Filtered Oil	10	...	...	...	...	...	...	...	...	...	...	...
180 Vis. Treated Oil (actual Vis. 172 at 100°F.)	93	...	...	...	...	...	...	211	...	...	...	...
Bright Stock (360 color on Lovibond ½-inch cell	7	...	...	...	...	...	...	...	...	...	...	...
180 Vis. Treated Oil (actual Vis. 172 at 100°F.)	84	...	...	...	...	...	...	...	251	...	...	...
Bright Stock (220 color on Lovibond ½-inch cell	16	...	...	...	...	...	...	...	...	...	...	...
Above Oil Filtered to 4 N.P.A. color	..	...	...	...	...	...	...	...	...	250	...	...
180 Vis. Treated Oil (actual Vis. 172 at 100°F.	78	...	...	...	...	...	...	...	...	...	303	...
Bright Stock	22	...	...	...	...	...	...	...	...	...	...	...
180 Vis. Filtered Oil (actual Vis. 167 at 100°F.)	74	...	...	...	...	...	...	...	...	...	...	304
Bright Stock	26	...	...	...	...	...	...	...	...	...	...	...

Table IV shows a comparison of the physical characteristics of oils made by blending in the manner indicated in Table III and oils of similar viscosity made either by the straight reduction of overhead lubricating distillates, obtained from pressed distillate, or by the straight reduction of the pressed distillate itself to viscous bottoms.

A study of Table IV shows clearly the differences in the physical characteristics of oils made by blending a low viscosity residual oil from pressed distillate (179 viscosity oil before acid treatment and filtration) with both lighter and heavier-bodied oils in order to make oils of various viscosities; as compared with oils of similar viscosity made either by the straight reduction of an overhead lubricating distillate from pressed distillate or by the reduction of the pressed distillate itself to the proper flash and viscosity test, and then either treating only, or both treating and filtering these residual oils to the color desired.

In general, the physical characteristics of the oils made by both methods are very similar, with the main exception that, in the case of the more viscous oils — 200, 250 and 300 red oils, both treated and filtered — the oils made by blending show a lower flash test (from 10 degrees to 20 degrees Fahrenheit lower) than oils of similar viscosity made by the straight reduction of the pressed distillate.

TABLE IV

Comparative physical tests on oils made by blending 180 viscosity oil in the manner indicated in Table III and oils of similar viscosity made either by the straight reduction of

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overhead lubricating distillates or by the straight reduction of the pressed distillate to viscous bottoms.

	To Make 25 Pale Trtd. Oil.		To Make 28 Pale Fltd Oil.		To Make 25 Pale Trtd. Oil.		To Make 25 Pale Fltd. Oil.		To Make 160 Viscosity Trtd. Oil.	
	Made by Blending 43% 180 Vis. Trtd. and 57% 30 Pale Oil Trtd.	Made by Reduction of Overhead Distillate and Treating.	Made by Blending 43% 180 Vis. Fltd. and 57% 30 Pale Oil Fltd.	Made by Reduction of Overhead Distillate, Trtd. and Filtering.	Made by Blending 64% 180 Vis. Trtd. and 16% 30 Pale Oil Trtd.	Made by Reduction of Overhead Distillate and Treating.	Made by Blending 84% 180 Vis. Fltd. and 16% 30 Pale Oil Fltd.	Made by Reduction of Overhead Distillate, Treating and Filtering.	Made by Blending 80.6% 180 Vis. Trtd., 15.4% 30 Pale Oil Trtd. and 4.0% Special Trtd. Cyl. Stock.	Made by Reduction of Pressed Distillate to Proper Flash and Vis., and Treating to Color
Gravity °A.P.I.	28.6	28.5	28.7	28.6	27.5	27.4	28.0	27.6	27.4	27.4
Flash °F.	355	350	355	350	375	385	360	385	385	380
Fire °F.	405	410	405	410	430	440	440	440	435	430
Viscosity at 100° F.	103	102	104	100	153	155	153	153	162	160
Pour Test	25	25	25	25	25	30	25	25	25	35
Solidification Point.	20	22	20	20	22	26	22	23	24	32
Color N.P.A.	2	2½	1½ to 2	1½	3½	4	2 to 2½	2 to 3	6	6

	To Make 200 Vis. Red Oil Trtd		To Make 180 Vis. Red Oil Fltd		To Make 250 Vis. Red Oil Trtd		To Make 250 Vis. Red Oil Trtd		To Make 300 Vis. Red Oil Trtd		To Make 300 Vis. Red Oil Fltd	
	Made by Blending 93% 180 Vis. Oil Trtd with 27% Brt. Stk (360 Color & Inch cell)	Made by Reduction of Pressed Distillate to Proper Flash and Vis. and Treat to Color	Made by Blending 90% 180 Vis. Fltd and 10% 250 Red Oil Fltd	Made by Reduction of Pressed Distillate to Proper Flash and Vis., and Treating and Filtering to Color.	Made by Blending 84% 180 Vis. Trtd and 16% Brt. Stk. (220 Color Lovibond ¼" cell)	Made by Reduction of Pressed Distillate to Proper Flash and Vis. and Treating to Color.	Made by Filtering 250 Red Oil Trtd to 4 N.P.A Color	Made by Reduction of Pressed Distillate to Proper Flash and Vis. and Treating & Filtering to Color.	Made by Blending 78% 180 Vis. Trtd and 22% Brt. Stk.	Made by Reduction of Pressed Distillate to Proper Flash and Vis. and Treating to Color	Made by Blending 74% 160 Vis. Fltd. and 26% Brt. Stk.	Made by Reduction of Pressed Distillate to Proper Flash and Vis. and Treating and Filtering to Color
Gravity °A.P.I.	27.1	26.3	27.6	27.2	26.8	26.5	27.4	26.6	26.7	26.3	27.0	26.6
Flash °F.	390	400	390	390	390	405	395	405	410	420	400	420
Fire °F.	450	430	445	440	440	475	455	475	485	490	460	495
Viscosity at 100°F.	211	200	178	180	251	251	250	249	303	310	304	301
Pour Test	25	35	25	25	25	35	30	25	25	25	30	30
Solidification Point	20	34	20	22	20	32	26	24	22	23	26	25
Color N.P.A.	5	5	2-2½	2½	5	5	4	4	5½	5½	5	5

Domestic Exports of Petroleum and Refined Products

		November 1924	November 1925	11 Mos. Ended Nov. 1924	11 Mos. Ended Nov. 1925
Crude petroleum	Gals.	60,322,127	30,965,551	698,974,355	514,415,257
	$	2,104,238	1,362,731	24,986,759	22,601,120
Total refined petroleum	Gals.	312,212,520	345,822,553	3,598,961,746	3,550,642,067
	$	29,206,049	34,404,004	360,851,915	381,841,443
Gasoline, naphtha and other light products	Gals.	96,424,302	118,519,114	1,085,643,881	1,159,203,777
	$	12,054,819	17,198,425	154,165,295	178,996,756
Illuminating oils	Gals.	67,248,929	78,383,338	830,403,234	801,381,550
	$	6,782,749	6,582,334	81,131,609	75,849,898
Gas and fuel oils	Gals	118,699,830	119,439,241	1,332,369,162	1,226,602,171
	$	4,304,746	3,713,481	45,542,080	44,815,687
Lubricating oils	Gals.	29,839,459	29,480,860	350,535,479	363,454,569
	$	6,063,735	6,909,764	80,013,031	82,179,102
Paraffin wax, lbs.		28,654,033	31,106,879	351,216,646	301,823,666
	$	1,529,174	1,803,931	16,800,151	16,861,495

FIRST LIVE OAK GAS BURNED IN HOUSTON

HOUSTON, TEX., Jan. 9.—The honor of burning the first natural gas to reach Houston from the Refugio and Live Oak county fields, goes to E. H. Buckner, president of the Houston Oil Co., whose home here was piped on the last day of the year and the gas lighted for cooking purposes. The gas was piped to the city through the lines of the Houston Pipe Line Co., a subsidiary of the Houston Oil Co. The main line is approximately 300 miles long.

The event was made something of a celebration at the Buckner home and was attended by C. B. McKinney, general manager of the Houston Pipe Pine Co., Frank W. Kirk, general superintendent, E. A. MacPherson, of Fort Worth, the contractor who laid the lines and many others.

The Houston Pipe Line Co. is now laying several 8-inch mains across Trinity Bay to the plant of the Humble Oil & Refining Co. at Baytown and to the plant of the Galena-Signal Co. of Texas. Natural gas will be furnished these and other industries in the city and along the Houston ship channel.

The company has been furnishing approximately 16,000,000 cubic feet per day to the Texas-Gulf Sulphur Co. at Gulf, Matagorda County and just connected up the various manufacturing plants of the Sugarland Industrial Corporation at Sugarland, 30 miles southwest of Houston.

NEW DIRECTORS NAMED

PITTSBURGH, Pa., Jan. 9.—H. C. McEldowney and W. L. Mellon have been elected to the directorate of the Philadelphia Co., succeeding George E. McCague and George H. Davison.

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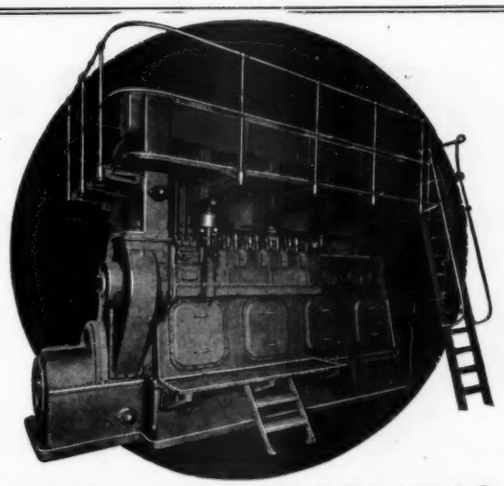

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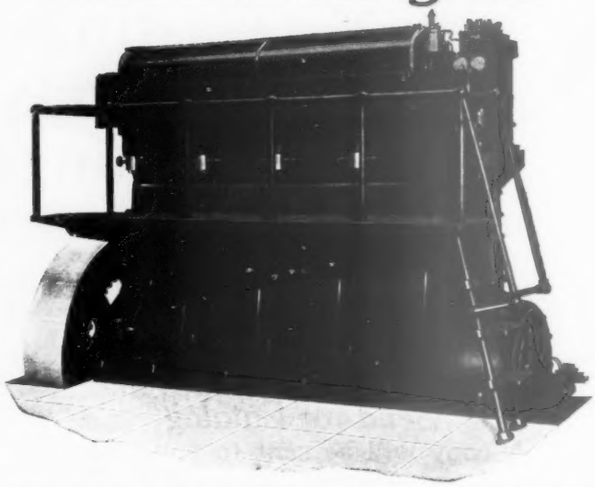

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NOW MORE MOTOR BUSES ABROAD THAN THERE ARE IN UNITED STATES

It will be news to most Americans that, despite the development of the motor bus here, there are already more motor buses in operation in the rest of the world than in the United States. This expansion abroad has come chiefly in the year just ended and, according to a survey by the automotive division of the Department of Commerce, promises to be continued in 1926.

There were 60,000 motor buses in operation in the United States January 1, 1925. It is estimated there has probably been at least a 50 per cent increase in the past 12 months. Meanwhile the Department of Commerce estimates there are probably 100,000 buses in operation today in countries other than the United States.

In Sweden the bus traffic has more than doubled in two years. Three years ago the first bus line was opened in China. Now there are 300 in use on 70 lines.

The French lead in the use of motor buses, operating 35,000 or almost half as many as in the United States at the time of the estimate. In Great Britain and Ireland there are about 19,000 motor buses whose lines are giving the remotest villages their first rapid transit.

Most astonishing is the fact that Italy has 15,000 motor buses or nearly as many as the United Kingdom. Germany has only 1,500 when the estimate was made, but is rapidly taking advantage of modern means of transit. Belgium had 1,000 and Holland 2,500.

Greece has 1,700; French Morocco 1,450 and Egypt 1,000. Spain had 1,150. British India reported 1,800 while Ceylon alone had 1,000 more. Australia, despite its being our best automobile customer, had only 1,653 motor buses, due possibly to the great distances between settlements and the concentration of population in large cities served by rail transportation. On the other hand, New Zealand had 1,200.

Used by Filipinoes and Cubans

In contrast to the 300 buses in use in China one to a hundred million population, there are 700 in Japan and 1,760 in the Philippines, this last possibly attributable to Americanization. On this hemisphere Cuba, also Americanized, is found using 1,150 motor buses, while Mexico had but 400.

In South America Chile uses 1,200 and Argentina 675. To the north, Canada reports 2,000, a number rapidly increasing, although surprisingly small compared to the 2,500 in use in Sweden.

The Department of Commerce reports show the number of motor buses in other countries as follows:

Norway, 900; Finland, 550; Baltic States, 250; Denmark, 820; Poland, 475; Danzig, 75; Czechoslovakia, 275; Austria, 250; Rumania, 500; Switzerland, 500; Portugal, 175; Spanish Morocco, 35; Tunisia, 150; Madeira Islands, 25; Azores Islands, 18; Palestine, 177; South Africa, 400; Siam, 150; Indo-China, 150; Dutch East Indies, 500; Uruguay, 200; Brazil, 150; Peru, 230; Bolivia, 20; Costa Rica, 35; Ecuador, 20; Guatemala, 10; Salvador, 16; Colombia, 90; Guiana, 40; Venezuela, 37; Honduras, 2; Jamaica, 6; Dominican Republic, 15; Haiti, 50; Porto Rico, 300; New Foundland, 8; Hawaii, 25.

The remarkable showing in some countries, as in Italy and French Morocco, is partly explained by Government subsidies, while in Spain, Switzerland and the Philippines mail contracts help.

In its survey the Department of Commerce says the middle classes in practically all countries are unanimously in favor of this new and in many cases less expensive means of travel. As a curious sidelight it is stated that in Peru the carelessness of the drivers has retarded extension of bus lines, but in some countries the buses have been practically taken over by the natives attracted by the novelty of motor riding and lower fares and greater convenience than previous modes of transit.

In Austria, Czechoslovakia and some of the newer nations there is a tendency to have the State or city go into the bus business as feeders to rail and tram lines. The chief limiting factors abroad at present are lack of good roads in the rural districts and narrow and crooked streets in the towns. The popularity of the motor bus is likely to promote a program for road improvement and street widening in backward countries.

Growth in United States

Meanwhile the growth of the motor bus in the United States continues to be the most important single new factor in our gasoline demand. A score of railroads within recent months have decided that the motor bus is a better ally than competitor.

In Minnesota the Great Northern Railway has licensed more than 100 buses to operate on highways paralleling its lines. The New Haven, the Reading, Chicago & Eastern, and Illinois roads are turning to the bus as feeders and substitutes on short hauls.

The Public Service Railways Co. of Newark, N. J., has just placed a $3,000,000 order for 333 motor coaches. This company is now operating over 800 coaches in New Jersey, having recently purchased a number of independent lines and established new routes.

The Boston Elevated recently purchased five buses and the Boston & Worcester road two, while five were bought for the Virginia Railway & Power Co. of Richmond, Va., which now operates 50.

The American Car & Foundry Co. announces the formation of a motors company, the first important entry by a railroad equipment company into the automotive field. It takes over controlling interest in a bus and truck manufacturing company and in a concern making motor engines.

Equally impressive as an exhibit of the development of bus traffic is a comparison published by Automotive Industries of the growth of travel by this agency. The Fifth Avenue Coach Co. of New York which hauled 40,000,000 passengers in the first seven months of 1924 hauled 48,000,000 in the same period of 1925.

The Chicago Motor Coach Co., which carried 32,000,000 passengers in the 1924 period, carried over 40,000,000 in the 1925 period.

The People's Motor Bus Co. of St. Louis shows an even more striking increase, carrying 16,410,000 in the 1925 period against 7,118,000 in the previous year's first seven months. This 131 per cent increase was due in part to the opening of 43 miles of new routes.

Like development has been in progress in nearly all other large centers of population and there is no indication that the demand for bus transportation has been anywhere near supplied.

When it is remembered that a modern motor bus will consume as much gasoline as 30 passenger cars during the year the importance of this development to the oil industry cannot be overestimated. Taken in conjunction with the amazing growth of motor bus use abroad, where the increase is even more rapid, largely because the people have not the use of individual cars, it is evident we are only on the eve of a development that will be one of the most far reaching in the market for motor fuel in the near future.

GEORGE J. HANKS PROMOTED

BRADFORD, Pa., Jan. 7—George J. Hanks, general superintendent and a member of the board of directors of the Tide Water Pipe Line Co. for the past two years, has been made vice president and general manager of the company, according to announcemen made by President John E. Golden today. The position of general superintendent has been discontinued.

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The OIL and GAS JOURNAL

TULSA, OKLA.

SOUTH PENN OIL CO. PROFITS BY FLOODING

South Penn Oil Co. is reported in the Wall Street Journal to be getting favorable results from the development of its properties in the Bradford Field, in McKean County, Pennsylvania, producing oil by flooding or "restored pressure." The company owns 14,000 acres of lands in the Bradford Field in that section. This method restores the pressure in the oil sand by introduction of water, whereby it is possible to recover a larger percentage of oil. Under the old method of flowing and pumping wells, only about 25 per cent of oil is recovered, which is obtained by natural pressure. When the gas pressure decreased, the production of oil decreased. It has been demonstrated it is possible to recover from 7,000 to 15,000 bbls. of oil additional an acre through introduction of water pressure.

The Bradford Field comprises an area of about 100,000 acres, largely in Pennsylvania, with less than one-third in New York. Area in which oil can be produced by the flooding method is placed at 80,000 acres. There are about 36,000 wells in the Bradford Field where production can be stimulated by the method of restored pressure.

It is estimated the amount of recoverable oil in the 14,000 acres of land which the South Penn Oil Co. owns in the Bradford Field is 15,000,000 bbls. South Penn Oil Co. during the last year drilled more than 300 wells in the Bradford Field and its program for 1926 calls for a larger number.

This method is steadily increasing production of oil by South Penn Oil Co. and is expected to continue. The company has 14,000 producing oil wells, the majority of which are in West Virginia.

Flooding, or "restored pressure" method of producing oil in the Bradford Field has resulted in a big increase in the value of land holdings. Properties yielding one-half barrel of oil a day have been sold on a basis of $12,000 a barrel of production.

THREE TESTS ABANDONED IN EAST CENTRAL TEXAS

CORSICANA, Tex., Jan. 7 — Three abandoned wells made up the sum total of East Central Texas completions in the week in review. In Hunt County the Gulf Production Co. abandoned No. 1 T. D. Bell, Bordine survey, at 2,157 feet. The same company has made a location for a test on the Hicks farm, Bordine survey.

In Limestone County, Eisenmayer and others' No. 2 Rivers, Abbott survey, was abandoned at 1,952 feet.

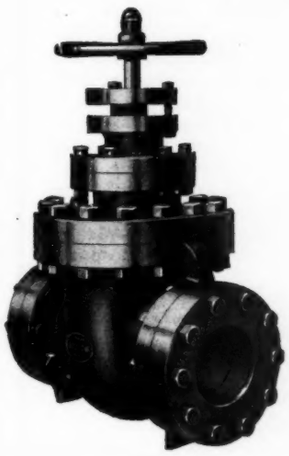
In Navarro County, E. L. Smith Oil Co.'s No. 1-A Swink, Hudson survey, Richland district, was abandoned at 1,863 feet. The Sun Oil Co. is drilling below 2,800 feet in No. 1-A Swink, Hudson survey.

Nearly all the work in the 10 counties making up the territory under exploration is shut down.

H. L. HAMILTON DIES

H. L. Hamilton, oil producer, geologist and engineer, died at this home in San Antonio at 2:30 December 29 and the body was taken to California, his former home, for burial. Mr. Hamilton had lately been a producer in the shallow Sunburst Field at San Antonio as well as in other fields and was making his home in San Antonio. He was a member of the American Association of Petroleum Geologists, and was a brother of W. R. Hamilton of Tulsa, Okla. H. L. Hamilton had operated in California and in Texas at Blue Ridge and Orange and was interested at the time of his death in North Texas production. He had been consulting engineer for numerous projects in Mexico and elsewhere and was a member of the American Institute of Mines and Engineering. He is survived by his widow, Mrs. Edna Durkee Hamilton, and one son, Lloyd Hamilton, of California. H. L. Hamilton's home in California, before he came to Texas, was at Palo Alto.

The Valve Makers Know....



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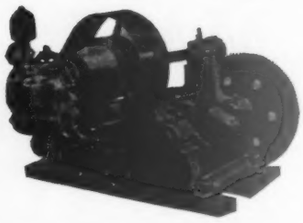

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CALIFORNIA MERGER AS SEEN ON WALL ST.

From an operating point of view, the merger of the Standard Oil Co. of California and the Pacific Oil Co., will, the Wall Street Journal says, further enhance the already clear leadership enjoyed by Standard Oil of California in the Pacific Coast territory. Standard Oil had a production itself early this year of around 80,000 bbls. of crude daily, with an additional 45,000 bbls. daily of crude oil shut in. Its present actual production is probably above the 80,000-bbl. figure. Acquisition of Pacific Oil will add 55,000 bbls. daily production and give Standard Oil one of the largest producing properties in the world. It will have close to 25 per cent of all the production in the State of California.

Perhaps the more important part of the acquisition, however, is that Pacific Oil properties are only partly developed. It owns in fee 261,000 acres in the San Joaquin Valley, of which 25,000 acres are in proven oil territory. The company's policy has been to drill only offset wells when necessary so that it has innumerable locations for inside wells which have not been drilled.

One of the assets to go into the combine is the 33 per cent interest in the Associated Pipe Line Co. held by Pacific Oil Co. The Associated Oil Co. also owns one-third interest in the pipe line as does the Southern Pacific Co. Perhaps one of the reasons for Associated Oil not going into the grouping was its ownership of the one-third interest in the pipe line. There is a state law in California, the Cartwright Act, which prohibits the merging of pipe line companies.

From the point of view of Southern Pacific Railroad stockholders, development of Pacific Oil Co. since its formation late in 1920 and its proposed combine with Standard of California has been a highly profitable experience. Shortly after the Supreme Court held that Southern Pacific's titles to the oil lands, held then through its wholly owned subsidiary, Southern Pacific Land Co., were valid, the Pacific Oil Co. was formed. The holdings of land and stock interest in Associated Oil Co. were put into the Pacific Oil Co., having the same number of shares, 3,500,000, as Southern Pacific. Stockholders of the latter were then given the right to purchase a share of Pacific Oil for $15 for each share of Southern Pacific held. By this subscription Southern Pacific holders put up $52,500,000.

The result has been probably the most valuable railroad melon distributed in many years, for Pacific Oil, selling at 78, has a market valuation of $273,000,000, or more than five times the offering price to Southern Pacific holders just five years ago. Thus, the original subscription has appreciated 100 per cent in each of the last five years.

In addition Pacific Oil stockholders have received substantial dividends. They have amounted in all to $45,500,000, or about 86 per cent of the original subscription. Dividends totaled $13 a share in the five years, a yearly average of $2.60 a share, or an average annual return of better than 17 per cent on the original price to Southern Pacific stockholders of $15 a share.

In the five years it has been in business Pacific Oil Co. has had net profits of $79,523,505, this figure being arrived at by including results for the first nine months of 1925 and an estimate for the last quarter. From these profits a total of $14,638,111 was deducted for depletion and depreciation, and $45,500,000 for dividend payments, leaving a balance to surplus of $19,385,394.

PIPE LINE BUILDING IN CALIFORNIA FIELD

One of the principal advantages of California oil fields which is seldom mentioned and, except in the higher circles of the industry, is rarely even thought of, says Robert J. Pritchard in the Los

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Angeles Times, is the proximity of most of California's oil fields to Los Angeles Harbor.

This condition is responsible for the high proportion which the field or gathering systems of the State bear to the total mileage of California oil pipe lines. This applies particularly to Southern California, where none of the major fields is more than 25 miles from the harbor, and the largest of them all—Signal Hill—is practically at tidewater.

This is the reason for the absence in California of the long and expensive pipe line systems which are necessary in the producing districts not so favorably located with reference to marine terminals.

The longest pipe line in California is only 363 miles, which is not much more than one-tenth the length of some pipe lines in the East which are necessary to get the oil from the fields in distant, semi-settled regions to the refineries.

All the pipe lines in California which are used in the transportation of oil aggregate 5,518 miles. Of this total 1,753 miles are gathering lines used to conduct the oil from individual wells and tanks to trunk lines. The remaining 3,765 miles are trunk lines, transporting oil from the fields to refineries or marine terminals for shipment.

Approximately 250 miles of new pipe lines were laid in California during 1925. This included the construction of the Los Angeles Midway Pipe Line Co.'s line from the Kern County oil fields to Wilmington, a distance of 125 miles. Most of the remaining lines were built into the Inglewood and Athens fields.

It is significant that these two fields of major importance whose combined output at their peak totaled nearly 150,000 barrels per day should call for such an inexpensive pipe line program. The reason is that neither field was more than 25 miles from the refineries of the principal producers.

Practically all of the new pipe lines were laid in Southern California, or to Southern California. New developments in the northern fields consisted mostly in the extension of old fields, or in the discovery of deep sands which called for no new transportation facilities.

Of the State's total of 5,518 miles of pipe lines, 1,780 miles are either in Southern California or extend to Southern California. This figure includes the trunk lines of the Los Angeles Midway Pipe Line Co. and the General Petroleum Corp., both of which carry oil from the northern fields to Los Angeles and vicinity. The remaining 3,738 miles of pipe line connect the more widely scattered fields of the northern producing districts, and includes the Standard Oil Co.'s 363-mile line from Coalinga to Richmond.

This line is figured at about three times its actual length of 363 miles because for part of its distance it is a double line, part of the way a triple line, and part of the way a quadruple line.

CHARTERED IN TEXAS

AUSTIN, TEX., Jan. 9.—Chartered: T. T. Word Supply Co., Houston, oil well supplies, capital $10,000; incorporators, T. T. Word, Charles Markle, M. L. Middleton; Roy Long Oil Co., Rockdale, capital $78,000; incorporators Roy Long, A. H. Spann and Ed Blackshear; Western Oil Corp. of Texas, Wichita Falls, capital $100,000; incorporators S. J. Campbell, H. R. Robinson and Walter Campbell; Milton Oil Co., Fort Worth, capital $60,000; incorporators L. L. Lindsey Jr., A. H. Woodfin, Dave Milton. Foreign permit: Interocean Oil Co., Tulsa, Okla., capital $5,105,000; Texas headquarters, Burkburnett; A. L. Gronvold, state agent.

STUDY OIL FOR FUEL

STATE COLLEGE, Pa., Jan. 9.—Advantages and disadvantages of the use of fuel oil for house heating purposes are being studied by specialists at the engineering experiment station of Pennsylvania State College. The results of the study will be made public in a bulletin.

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New Petroleum Law Enacted in Mexico Still Objectionable

Promulgation by the Mexican Department of the Interior on December 28 of a Presidential decree declaring that the Government's petroleum bill, recently enacted, is now in effect, gives Mexico a petroleum law interpreting the Carranza Constitution of 1917 for the first time since the Constitution went into effect. Practically every Congressional session since 1917 has had a petroleum code under discussion but none came through for final enactment until the present one.

The new law as passed by the Chamber of Deputies and the Senate was somewhat modified from the original bill, which was prepared by a commission comprised of representatives of both houses and the Department of Industry, Commerce and Labor. The law declares that ownership of petroleum is vested in the nation and declares the petroleum industry to be a public utility. The law provides not only for the granting of concessions for oil exploration and exploitation but for common carrier pipe lines and for the establishment of refineries.

Foreign Minister Saenz is quoted in Mexico City as saying that a communication wil lbe issued shortly outlining the methods of procedure under the bill and that facilities would be given for the investment of foreign capital and that, as far as possible, hardships for foreign investors would be removed. Inquiry made in New York among American oil companies operating in Mexico brought out that the new law is considered confiscatory. To sum up the views expressed, the law violates:

(1) The vested rights of companies long established and operating in Mexico.

(2) The provisions of the Mexican Constitution itself.

(3) The agreement reached between the Mexican and American Governments in 1923 upon which was based Mexican recognition by the United States.

(4) The rights acquired by foreign oil interests prior to May 1, 1917, when the Mexican Constitution went into effect.

Diplomatic representations have been made for some time past by the American Ambassador at Mexico City under instructions from the State Deportment respecting the pending petroleum legislation, but in spite of apparent protests the bill, with objectionable features intact, continued to have the Mexican Government's backing.

Just what effect the new law will have on the operations of American oil companies in Mexico, it is too early to state. None of the representatives of companies affected would venture an opinion, but if the views expressed as to the confiscatory and retroactive features of the law is any criterion, there will be serious restriction of operations and financing of operations for exploration and development of new fields by these interests is out of the question.

OIL BURNER DEMAND 20 PER CENT LARGER

As reflected by the demand made on furnace oil distributors, household oil heating is now on a much more extensive basis in many parts of the country than ever before. The number of residential oil burners in use is larger by an estimated 15 to 20 per cent than at this time last year.

"The adoption of oil for house heating is now literally sweeping the country," according to Henry L. Doherty. "No accurate figures are yet available on the consumption of oil for house heating, but this new market has been increasing more rapidly on a percentage basis than our consumption of gasoline for automobiles has ever done.

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Incidentally, Mr. Doherty sees the general petroleum situation as being more reassuring than at any time in four years. He looks for growth of cooperation among oil men to diminish recurrence of slumps in the business in the future.

New Books

The fourth edition of the Manual of Industrial Chemistry in two volumes is distributed by D. Van Nostrand Co., of New York. This work embodies the chemical processes of almost every conceivable branch of industry, and gives a detailed description of the workings of many lines of manufacture.

The book contains a chapter devoted to petroleum chemistry by Thomas T. Gray, chief chemist of the Tide Water Oil Co., of Bayonne, N. J. It treats with refining processes and describes the handling of crude oil from the pipe line to the finished product of the refinery. The work is edited by Allen Rogers, of Pratt Institute, Brooklyn, N. Y., in collaboration with a number of distinguished authors.

The Van Nostrand Co. also is distributing the fourth edition of "Standard Methods of Chemical Analysis," edited by Wilfred W. Scott, of the University of Southern California. This is a compilation of carefully selected methods of technical analysis which have proved to be of practical value to the professional chemist, and yet the subjects have been presented with sufficient detail to enable one with an elementary knowledge of analytical processes to follow the directions. Lengthy exposition and experimental dissertation are avoided in the work in order to include a large amount of information in a compact accessible form.

The Chemical Catalog Co., Inc., of New York City has issued two new books of the American Chemical Society Monograph series. These books are entitled, "The Recovery of Gasoline from Natural Gas," by George A. Burrell, and "Coal Carbonization," by H. C. Porter.

The publication of the Monograph series marks a distinct departure in the policy of the American Chemical Society, inasmuch as it is a serious attempt to found an American chemical literature without regard to commercial considerations.

Many chemists fail to realize how closely their investigations may be connected with other work which on the surface appears far afield from their own; and these books will enable such men to form closer contact with the work of chemists in other lines of work.

Diesel Engines

The McGraw-Hill Publishing Co., of New York, has distributed a book entitled "Diesel Engines," by Lacey H. Morrison. Mr. Morrison is a member of the editorial staff of "Power" and has given considerable study to this type of engine. He has compiled a great amount of information regarding internal combustion engines, most of which has been published in book form by the McGraw-Hill Co.

The work on Diesel engines gives great space to the cost of producing this equipment, and when it is considered that at present 25 concerns are manufacturing engines of this type, these figures are almost as vital as operating procedure. A chapter of the book gives a history of the Diesel engine in America, portraying the development of the engine and its applicability to modern industry.

Since the success of the internal combustion engine indicates that it has an assured future, the book can well be studied by all interested in conditions embodying power requirements.

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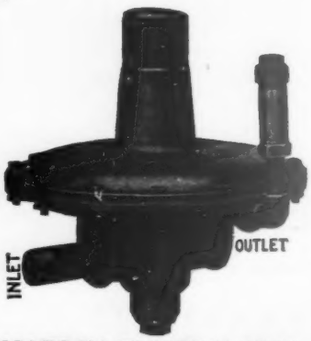

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The OIL and GAS JOURNAL
TULSA, OKLA.

GREATEST PETROLEUM PORT IN THE WORLD

Los Angeles Harbor is regarded, says the Los Angeles Times, as the greatest petroleum shipping center in the world. Last year oil in crude and refined state was exported from the harbor at the rate of 2,000,000 bbls. per week.

This average has been maintained for fully two years. At times the shipments have reached as high as 2,900,000 bbls. per week.

During 1924 the harbor exported 101,666,466 bbls. of petroleum products. The marine bureau of the Los Angeles Chamber of Commerce estimated that oil exports for 1925 totaled 101,760,619 bbls. —just a shade more than the previous year's record.

During 1925 Southern California petroleum passed through the Panama Canal at the rate of nearly 550,000 bbls. per week. The canal shipments from here totaled 28,598,893 bbls., netting the canal $2,218,638 in tolls.

As a result of the rapid expansion of marketing facilities the oil refiners were able to export from Los Angeles, for the Pacific Coast domestic trade, a great deal more oil than they turned into this channel during the previous year, the increase being reflected in the shipment of 52,086,708 bbls. against 36,524,239 for the previous year. Of that amount the crude shipments were 34,674,219 bbls. against 23,737,182 bbls., the gasoline shipments were 3,723,283 bbls. against 2,082,289 bbls., and fuel oil shipments were 13,066,048 bbls. against 10,176,360 bbls.

Shipments of petroleum from Los Angeles to the Pacific foreign trade totaled 20,175,020 bbls. for 1925 against 15,902,257 barrels for 1924. The crude demand was 2,248,200 bbls. against 1,665,713 bbls., fuel oil shipments were 14,611,096 against 12,144,877 bbls., and kerosene shipments were 2,492,572 bbls. against 1,586,267 bbls.

Crude oil export to the Atlantic Coast trade showed a marked decline in 1925, being 14,406,310 bbls., compared to 36,853,654 bbls. during the previous year, but this was more than counterbalanced by the gain in gasoline shipments to the Atlantic, the increase being 7,532,820 bbls. against 1,569,541 bbls. during the previous year.

Shipments via the canal to the Atlantic foreign trade indicated that the gasoline trade held almost even for two years, the year 1924 showing 3,756,140 bbls., and 1925 showing 3,646,267 bbls. A large part of this went to the British Isles. It is estimated that England has been taking about 150,000 bbls. of Los Angeles gasoline per month for the last two years. Shipments of fuel oil for the Atlantic foreign trade amounted to 1,802,208 bbls., compared with 1,305,125 bbls. during the previous year.

Oil tank steamers call at Los Angeles Harbor and load at the rate of 30 a week throughout the year.

PROGRESS IN REFINING ON THE PACIFIC COAST

In addition to leading the world in petroleum production during 1925, California, the Los Angeles Times claims, was foremost in the refining of crude oil. In five years the state has more than doubled its refinery capacity, and in the amount of crude run to stills during the first eight months of last year it led its nearest competitor by a wide margin.

In the first eight months of the year California ran 117,207,317 bbls. of crude to its refinery stills, while Texas ran 95,078,650 bbls. Oklahoma and Kansas ran 66,128,394 bbls. and the east coast district ran 88,464,434 bbls.

California's output of gasoline for this period was 1,104,050,522 gallons, Texas making 1,470,432,318 gallons and Oklahoma and Kansas making 1,343,273,692 gallons. The reason California did not top the list in gasoline production is that it does not crack its still residue down as much as refiners in other states do.

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and a good market for all petroleum products, less than 1 per cent of California's gasoline comes from cracking, while the Indiana-Illinois district charges 40 per cent of its gasoline production to cracking. In October, 1925, California produced 654,248 gallons of gasoline by cracking and 149,778,274 gallons by straight refinery run.

Few Southern California industries, however rapidly they have grown, have enjoyed such rapid expansion as the refinery business. In 1920 the state had 41 refineries, with a combined capacity of 310,320 bbls. per day. In 1925 the business embraced 52 refineries, with a combined still capacity of 655,950 bbls. per day.

During August, 1920, California produced 46,699,059 gallos of gasoline from 7,025,784 bbls of crude oil. In August, 1925, the refineries of California made 150,432,522 gallons of gasoline from 17,740,986 bbls. of crude.

Five years ago there were less than a dozen brands of gasoline made and marketed in California. Today there are more than 50 recognized made-in-California brands of gasoline. Some of California's refineries have capacities ranging between 50,000 and 100,000 bbls. per day. The majority of the refining is done within a radius of 25 miles from Los Angeles Harbor, and several of the biggest refining plants are located in the harbor's back yard.

Almost unbelievable progress has been made within the last five years in the establishment and operation of casinghead and gas-absorption plants for the manufacture of gasoline from wet gas out of the oil wells, particularly in the Los Angeles Basin.

There were approximately 50 of these plants in the state in 1920. Now there are 146 in active operation.

WORK ON SHALE PLANT ENDED UNTIL SPRING

Work on the government experimental oil shale plant near Rulison has been suspended until next spring, and John Shaw, the engineer who was brought from Scotland to look after the installation of the retort, has returned to his home.

The sum of $90,000 was appropriated by Congress for construction ond operation of the plant, which will be in charge of the Bureau of Mines, and is being designed for the purpose of continuing experimental work on oil shales on a larger scale, in expectation that the bureau can develop a process for making shale oil. A retort of a Scottish type was purchased and shipped from Scotland, and Mr. Shaw was employed as an expert during the construction period. Shale is to be mined from the naval oil shale reserve near Rulison for handling in the plant, to which it will be delivered by an aerial tramway. The site of the plant is about two miles north of Rulison, a flag station on the D. & R. G. about 18 miles from De Beque.

ARKANSAS IS ADDING CASINGHEAD PLANTS

SHREVEPORT, LA., Jan. 9.—Three large casing head gas plants are being added to the Arkansas territory, at an expenditure of more than a million dollars. One plant has just been completed by the Natural Gas & Fuel Corporation in the Louann district, costing approximately $400,000, and construction of another plant by the same company will be started at Norphlet within a few weeks, the second plant to cost in the neighborhood of $300,000.

The Signal Gasoline Company, of California, has recently entered the Arkansas field, and has contracted with the Forrest El Gilmore Engineering Company for a $300,000-plant to be built at Norphlet, the work to be completed within four months. This plant will be located on the S. D. Cook land, adjoining the Norphlet townsite on the north.

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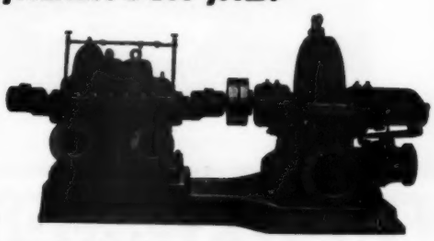
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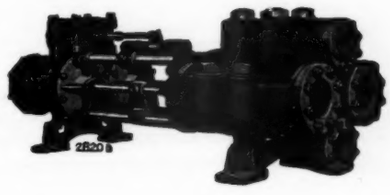
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Demand For Gasoline In Europe to Grow View of Deterding

Sir Henri Deterding, managing director of the Royal Dutch-Shell group, regarding the outlook for the oil business in 1926, says: "There should be a big demand for gasoline and other crude petroleum products during 1926. European countries must steadily increase their consumption of gasoline."

He believes European countries are ready for large increase in motor truck transportation and believes railroads should consider carefully the advisability of using truck transportation as feeding lines to the rail systems.

"I do not fear an oil shortage," he said. "So long as reasonably good prices prevail oil men will continue search for new production."

TEXAS WILL NOT JOIN IN REAGAN LAWSUITS

AUSTIN, Tex., Jan. 9—The attorney general will not seek to set aside or interfere with the oil leases held in the Reagan County fields on university lands and will not join in the two suits filed in the Travis County District Court attacking the leases and seeking recovery of $24,000,000 repesented in oil alleged to have been taken under the leases, almost entirely by the Big Lake and Texon companies. Several Austin people filed suits assailing the leases, endeavoring to have the land awarded them under their applications filed in the General Land Office.

With the land commission recognizing the leases as valid by collecting royalty and authorizing new well locations and the university receiving its royalty promptly during the period of production, the attorney general has decided not to attack the leases, at least on any representations made up to this time as to their alleged invalidity. The principal point was that the first wells were not producing oil commercially within the specified time. If that was conceded true, it was declared at the attorney general's department, the lessees never stopped prospecting and never stopped developing the university lands. A question of fact develops as to whether the law was complied with in the matter of preliminary reports and affidavits and the attorney general refuses to attack it.

The total oil royalty fund of the university is now $2,160,000 of which amount a little more than $200,000 was deposited to the credit of the permanent fund before the enactment of the law by the last Legislature assigning the proceeds from this source to the available fund of the university. Hearing on the mandamus case to determine validity of the last law is set by Supreme Court for early in January.

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Classified Wants
Pages 212-213
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GAS OFFICIAL BURNED

CHATHAM, Ont., Jan. 9.—Geoffrey Pollard, local manager for the Canadian Western Natural Gas Co. at Macleod, Alta., was badly burned a few days ago in an explosion at the high pressure gas station. Mr. Pollard is now undergoing treatment in the Macleod Hospital.

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Standard Engineering Co.

Diesel Engines (See Engines)—

Dies—Pipe Threading—
Bignall & Keeler Machine Works.
Borden Co.
Cox & Sons Co., The
Landis Machine Co.
Nye Tool & Machine Works.
Standard Engineering Co.

Differential Pressure Recorders (See Recorders)—

Direct Driven Pumps (See Pumps)

Disc Bits (See Bits—Disc)—

Dissolved Actelyene (See Acetylene)—

Distillate—
Acme Petroleum Co.

Ditchers—Pipe Line—
Barber-Greene Co.
Buckeye Traction Ditcher Co.

Draw Works—
Lucey Mfg. Corp.
Lufkin Foundry & Machine Co.
National Supply Co.
Titusville Iron Works Co.

Drillers Hose (See Hose)—

Drilling and Fishing Tools—
Acme Fishing Tool Co.
Baash-Ross Tool Co.
Bovaird & Seyfang Mfg. Co.
Bovaird Supply Co.
Bridgeport Machine Co.
Burns Tool Co.
Continental Supply Co.
Hinderliter Tool Co.
Hughes Tool Co.
International Supply Co.
Larkin & Co.
Leidecker Tool Co.
Lucey Mfg. Corp.
Oil Well Supply Co.
Reed Roller Bit Co.
Regan Forge & Engineering Co.
Spang & Co.
Star Drilling Machine Co.
U. S. Tool Co.

Drilling Engines (See Engines)—

Drilling Equipment—
Clark Brothers Co.
Hughes Tool Co.
O'Brien Steel Construction Co.
Oil Well Supply Co.
Parkersburg Rig & Reel Co.
Reed Roller Bit Co.
Star Drilling Machine Co.

Drilling Gate Valves (See Valves)

Drilling Machines—
Bridgeport Machine Co.
Leidecker Tool Co.
Oil Well Supply Co.
Star Drilling Machine Co.

Drilling Tools (See Drilling and Fishing Tools)—

Drilling Valves (See Valves)—

Drills—Portable, Air—
Chicago Pneumatic Tool Co.

Drills—Portable Electric—
Chicago Pneumatic Tool Co.

Drive Shoes—
Bartlesville Supply Co.
Larkin & Co.

Drop-Forged Wrenches (See Wrenches)—

Drops and Seats—
Norris Brothers, Inc.

Drums (See Barrels)—

Dynamos—
Westinghouse Electric & Mfg. Co.

E

Electrical Equipment—
Fairbanks-Morse & Co.
Pyle National Co.
Wico Electric Co.

Electric Apparatus (See Apparatus—Electric—

Electric Drilling Equipment—
Lucey Mfg. Corp.
Westinghouse Electric & Mfg. Co.

Electric Pumping and Pulling Motors (See Pumping and Pulling Motors—Electric)—

Electric Steel Castings — (See Castings—Electric Steel)—

Elevators—Casing and Tubing—
Bovaird Supply Co.
Bridgeport Machine Co.
Dunn Mfg. Co.
Lucey Mfg. Corp.
Oil Well Supply Co.
Wilson Oil Tools Corp.

Elevators—Rod—
Dunn Mfg. Co.
Foggan, Geo. N.

Enamels—
Sherwin-Williams Co.

Engineers—Consulting and Contracting—
Hope Engineering & Supply Co.
Kellogg, M. W. Co.
Power Specialty Co.
Westcott & Greis.

Engineers—Fire Protection—
Foamite-Childs Corp.

Engineers—Oil Buildings—
Austin Co.
International Derrick & Equipment Co.

Engineers—Oil Treating—
Barnickel, Wm. S. & Co.

Engines—Crude Oil—
Power Mfg. Co.
Western Machinery Co.

Engines—Diesel—
Bessemer Gas Engine Co.
Busch-Sulzer Bros. Diesel Engine Co.
Foos Gas Engine Co.
McIntosh & Seymour Corp.
Western Machinery Co.
Worthington Pump & Machinery Corp.

Engines—Drilling—
Ajax Iron Works.
Beaver Manufacturing Co.
Bessemer Gas Engine Co.
Bovaird & Seyfang Mfg. Co.
Buda Co.
Buffalo Gasolene Motor Co.
Clark Brothers Co.
Continental Supply Co.
Franklin Valveless Engine Co.
Hercules Motor Corp.
Lufkin Foundry & Machine Co.
Pattin Bros. Co.
Power Mfg. Co.
Republic Supply Co.
Titusville Iron Works Co.

Engines—Gas—
Bessemer Gas Engine Co.
Bruce-MacBeth Engine Co.
Buda Co.
Buffalo Gasolene Motor Co.
Chicago Pneumatic Tool Co.
Clark Brothers Co.
Cooper, C. & G. Co.
Foos Gas Engine Co.
Franklin Valveless Engine Co.
Frick-Reid Supply Co.
Hope Engineering & Supply Co.
Ingersoll-Rand Co.
International Supply Co.
Jones, S. M. Co.
Marion Mch., Fdy. & Supply Co.
Miller Improved Gas Engine Co.
National Supply Co.
National Transit Pump & Machine Co.
Oil Well Supply Co.
Pattin Bros. Co.
Reid, Joseph, Gas Engine Co.
Titusville Iron Works Co.
Waukesha Motor Co.
Western Machinery Co.

Engines—Gasoline—
Buda Co.
Buffalo Gasolene Motor Co.
Climax Engineering Corp.
Continental Motors Corp.
Fairbanks-Morse & Co.
International Harvester Co. of America.
Novo Engine Co.
Waukesha Motor Co.
Western Machinery Co.

Engines—Oil—
Bessemer Gas Engine Co.
De La Vergne Machine Co.
Fairbanks-Morse & Co.
Franklin Valveless Engine Co.
International Harvester Co. of America.
Mcintosh & Seymour Corp.
National Supply Co.
Oil Well Supply Co.
Reid, Joseph, Gas Engine Co.
Western Machinery Co.

Engines—Rotary Steam—
Baker Motors, Inc.

Engines—Semi-Diesel, Oil—
Chicago Pneumatic Tool Co.
Power Mfg. Co.

Engines—Steam—
Ajax Iron Works.
Baker Motors, Inc.
Frick-Reid Supply Co.
Lucey Mfg. Corp.
National Supply Co.
Oil Well Supply Co.

Evaporators—
Newton Process Mfg. Co.

Expansion Pistons (See Pistons)—

Extinguishers—Fire—
Amdyco Corp.
Foamite-Childs Corp.

F

Fabricators for Gasoline Plants and Refineries—
Stearns-Roger Mfg. Co.

Fence—Chain Link—
Page Fence & Wire Products Association.

Filters—
Metric Metal Works.

Fire Extinguishers (See Extinguishers)—

Fishing Tools (See Drilling and Fishing Tools)—

Fish Tail Bits (See Bits)—

Fittings—Dropped Forged Steel—
Carbondale Machine Co.
Vogt, Henry, Machine Co.

Fittings—Malleable & Cast Iron—
Bovaird Supply Co.
Crane Co.
Frick-Reid Supply Co.
Kelly & Jones Co.
Walworth Mfg. Co.

Fittings—Pipe—
American Cast Iron Pipe Co.
Dayton Pipe Coupling Co.
Dresser, S. R., Mfg. Co.
Gaso Pump & Burner Co.
Jarecki Mfg. Co.
Kellogg, M. W., Co.
Kennedy Valve Mfg. Co.
Lufkin Foundry & Machine Co.
Metric Metal Works.
Oil Well Supply Co.
Reading Steel Casting Co.
Republic Supply Co.
United Iron Works, Inc.

Fittings—Steel—
Dayton Pipe Coupling Co.
Kelly & Jones Co.
Ohio Steel Foundry Co.
Pittsburgh Reinforced Brazing & Machine Co.

Flanges—Brass, Iron and Steel—
Kelly & Jones Co.
Metric Metal Works.

Flange Unions—
Gaso Pump & Burner Mfg. Co.

Flashlights—
Delta Electric Co.
National Carbon Co.

Floating Roofs and Decks—
Chicago Bridge & Iron Works
Columbian Steel Tank Co.

Floodlights—
Pyle-National Co.

Floor Circle Braces (See Braces)

Force Feed Lubricators (See Lubricators)—

Forging Billets—
Andrews Steel Co.
Harrisburg Pipe & Pipe Bending Co.
Heppenstall Forge & Knife Co.

Forgings—
Champion Machine & Forging Co.
Milwaukee Forge & Machine Co.

Friction Clutch Pulleys (See Pulleys)—

Fuel Oil (See Oil—Fuel)—

G

Gas and Oil Gate Valves (See Valves)—

Gas Compressors (See Compressors—Gas)—

Gas Engines (See Engines—Gas)

Gas Holders—
Chicago Bridge & Iron Works.

Gaskets—
Garlock Packing Co.
McCord Radiator & Mfg. Co.

Gaskets—Fibre—
Durabla Mfg. Co.

Gas Masks & Safety Appliances—
Mine Safety Appliance Co.

Gas Meters (See Meters)—

Gas Oil (See Oil—Gas)—

Gasoline—
Berry's, James B. Sons Co.
Crown Central Petroleum Corp.
Empire Refineries, Inc.
Gulf Refining Co.
Magnolia Petroleum Co.
Pure Oil Co.
Sinclair Refining Co.
Skelly Oil Co.

Gasoline—Natural—
Chestnut & Smith Corp.

Gasoline Plant Equipment—
Bessemer Gas Engine Co.
Chicago Bridge & Iron Works.
Clark Brothers Co.
Kellogg, M. W., Co.
Newton Process Mfg. Co.

Gas Regulator Casinghead—
Davis Regulator Co.

Gas Regulators—
Chaplin Fulton Mfg. Co.
Davis Regulator Co.
Fisher Governor Co.
Metric Metal Works.
Smith Separator Co.

Gas Scrubbers—
Newton Process Mfg. Co.

Gauge Glass—High Pressure—
Durabla Mfg. Co.

Gauge Poles—
Marsh Gauge Pole Co.

Gauges—Automatic Tank—
Oil Conservation Engineering Co.

Gauges—Pressure and Vacuum—
Bristol Co.
Foxboro Co., Inc.
Metric Metal Works.

Gauges—Test—
Metric Metal Works.

Gear Driven Pumps (See Pumps)

Gears—Cut—
Nuttall, R. D., & Co.

Gears—Reduction—
Nuttall, R. D., & Co.

Generators—
Westinghouse Electric & Mfg. Co.

Generators—Acetylene—
Oxweld Acetylene Co.

Generators—Steam—
Baker Motors, Inc.

Generators—Turbine—
Moon Manufacturing Co.
Pyle-National Co.
Westinghouse Electric & Mfg. Co.

Glass Bottles (See Bottles, Glass)

Glassware—Chemical for Laboratory Use—
Illinois Glass Co.

Governors—
Gardner Governor Co.

Governors—Boiler Feed—
Chaplin-Fulton Mfg. Co.
Fisher Governor Co.

Grey Iron Castings (See Castings)

H

Hammers—Chipping and Calking Pneumatic—
Chicago Pneumatic Tool Co.

Hammers—Riveting Pneumatic—
Chicago Pneumatic Tool Co.

Hangers—Iron and Steel—
Dodge Mfg. Corp.

Hatches—Gauge and Thief—
Oil Conservation Engineering Co.

Heat Exchangers—
Carbondale Machine Co.
Griscom-Russell Co.
Hope Engineering & Supply Co.
Newton Process Mfg. Co.
Southwestern Engineering Co., Inc.
Southwestern Engineering Corp.

Heat Interchangers—Fluid—
Braun, C. F. & Co.

High Pressure Gate Valves (See Valves)—

Hoists—Pneumatic, Geared and Universal—
Chicago Pneumatic Tool Co.
Yale & Towne Mfg. Co.

Hoists—Portable—
Wright Mfg. Co.
Yale & Towne Mfg. Co.

Hoists—Well Pulling—
Emsco Derrick & Equip Co.

Hooks for Rods and Tubing—
Dunn Mfg. Co.

Hose—
Fenwick-Reddaway Mfg. Co.

Hose—Drillers—
Goodrich, B. F. Rubber Co.

Hose—Oil Suction and Discharge
Goodrich, B. F., Rubber Co.

Hose—Rubber—
Goodyear Tire & Rubber Co.
United States Rubber Co.

Hot Rolled Strip Steel (See Steel)

Hydraulic Gate Valves (See Valves)—

Hydraulic Jacks (See Jacks)—

I

Insulation Materials—
Celite Products Co.
Johns-Manville, Inc.

Insurance—Fire—
Oil Insurance Association.

Insurance—Tornado—
Oil Insurance Association.

Iron Ingot—
American Rolling Mill Co.

J

Jacks—Hydraulic—
Bridgeport Machine Co.

Jacks—Lifting—
Templeton, Kenly & Co., Ltd.

Jacks—Pumping—
American Wells Works.
Bessemer Gas Engine Co.
Braden Co.
Frick-Reid Supply Co.
Jones, S. M., Co.
Kansas City Hay Press Co.
Spang & Co.

Jars—
Bridgeport Machine Co.
Spang & Co.

Jar Steel—
Andrews Steel Co.
Heppenstall Forge & Knife Co.

K

Kerosene—
Acme Petroleum Co.
Empire Refineries, Inc.
Gulf Refining Co.
Magnolia Petroleum Co.
Pure Oil Co.
Skelly Oil Co.

L

Lacquers—
Sherwin-Williams Co.

Lanterns—Electric—
Delta Electric Co.

Lanterns—Hand—
Delta Electric Co.

Lead and Mixed Metal Products—
Eagle-Picher Lead Co.

Lead in Oil—
Eagle-Picher Lead Co.
National Lead Co.

Lead Wool and Containers—
Eagle-Picher Lead Co.

Lifting Jacks (See Jacks)—

Lighting Equipment—
Climax Engineering Co.
Pyle National Co.
Westinghouse Electric & Mfg. Co.

Liquid Level Controls (See Controllers)—

Litharge—
Eagle-Picher Lead Co.
National Lead Co.

Loaders—Trucks—
Barber-Greene Co.

Long Distance Telephone—
American Telephone & Telegraph Co.

Lubricating Devices—
McCord Radiator & Mfg. Co.

Lubricating Oils (See Oils)—

Lubricators—
Ajax Iron Works.
Lunkenheimer Co.

Lubricators—Force Feed—
Manzel Brothers Co.
McCord Radiator & Mfg. Co.

M

Machine Tools—
Ryerson, Jos. T., & Sons, Inc.

Manholes—Tank—
Oil Conservation Engineering Co.

Manifolds—
Reid, Joseph, Gas Engine Co.

Metal Buildings Sectional (All Types (See Buildings)—

Meters—Gas—
Foxboro Co., Inc.
Metric Metal Works.
Pittsburgh Meter Co.
Roots, P. H. & F. M. Co.
Westcott and Greis.

Meters—Gasoline—
Pittsburgh Meter Co.

Meters—Oil—
Pittsburgh Meter Co.

Molded Goods—Rubber—
Goodyear Tire & Rubber Co.

Motor Controlled Apparatus (See Apparatus—Motor Control)—

Motors—Electric—
Fairbanks-Morse & Co.
Westinghouse Electric & Mfg. Co.

Motors—Gasoline (See Engines—Gasoline)—

Motor Trucks (See Trucks—Motor)—

N

Naphtha—
Pure Oil Co.

Natural Gasoline (See Gasoline—Natural)—

Natural Gasoline Plant Equipment
American Tank Co.
Campbell, J. A.
Chaplin-Fulton Mfg. Co.
Continental Supply Co.
Cooper, C. & G., Co.
Griscom-Russell Co.
Roots, P. H. & F. M., Co.
Smith Separator Co.
Westcott & Greis.

Nitrogen—
Linde Air Products Co.

O

Oil and Gas Pipe Line Construction—
Hope Engineering & Supply Co.

Oil Burners (See Burners—Oil)—

Oil Engines, Semi-Diesel (See Engines—Semi-Diesel Oil)—

Oil Field Equipment—
Baash-Ross Tool Co.
Baker Casing Shoe Co.
Bridgeport Machine Co.
Continental Supply Co.
Cunningham Co.
Gaso Pump & Burner Mfg. Co.
International Derrick & Equipment Co.
Iron King Mfg. Co.
Kaw Boiler Works Co.
National Supply Co.
Oil Well Supply Co.
Parkersburg Machine Co.
Parkersburg Rig & Reel Co.
Reed Roller Bit Co.
Regan Forge & Engineering Co.
Reid, Joseph, Gas Engine Co.
Republic Supply Co.
Trumble Gas Trap Co.

Oil Filters—
Burt Mfg. Co.

Oil—Fuel—
Acme Petroleum Co.
Crown Central Petroleum Corp.
Empire Refineries, Inc.
Gulf Refining Co.
Magnolia Petroleum Co.
Pure Oil Co.
Sinclair Refining Co.
The Texas Co.

Oil—Gas—
Acme Petroleum Co.
Crown Central Petroleum Corp.
Gulf Refining Co.
Pure Oil Co.
Sinclair Refining Co.
The Texas Co.

Oil—Lubricating—
Barnsdall Refining Co.
Berry's, James B. Sons Co.
Crown Central Petroleum Corp.
Empire Refineries, Inc.
Gulf Refining Co.
Magnolia Petroleum Co.
Pennzoil Co.
Pure Oil Co.
Sinclair Refining Co.
Skelly Oil Co.
The Texas Co.

Oil—Tractor—
Barnsdall Refining Co.
Gulf Refining Co.
Pennzoil Co.
Pure Oil Co.
Skelly Oil Co.

Oiling Devices—
Lunkenheimer Co.

Oil Meters (See Meters)—

Oil Piping Equipment (See Fittings)—

Oil Reclaiming Process—
Barnickel, Wm. S., & Co.
Houston Pump & Supply Co.

Oil Refinery Equipment (See Refinery Equipment)—

Oil Securities (See Securities)—

Oil Suction and Discharge Hose (See Hose)—

Oil Testing Instruments—
Taglabue, C. J., Mfg. Co.

Oil Well Cementing—
Halliburton, Erle P.

Oil Well Screens (See Screens)—

Oil Well Tools—
Hinderliter Tool Co.
Reed Roller Bit Co.
Star Drilling Machine Co.
Titusville Forge Co.
U. S. Tool Co.

Over Shots—
Reed Roller Bit Co.
Regan Forge & Engineering Co.

Oxygen—
Linde Air Products Co.

P

Packer Release—
Acme Fishing Tool Co.

Packers—
Goodyear Tire & Rubber Co.
Guiberson Corp.
Larkin & Co.
Layne & Bowler Co.
Oil Well Supply Co.
Regan Forge & Engineering Co.
Spang & Co.

Packing—
Crane Packing Co.
Durabla Mfg. Co.
Garlock Packing Co.
Goodrich, B. F., Rubber Co.
Imperial Belting Co.
Johns-Manville, Inc.
United States Rubber Co.

Paint Guns—
Binks Spray Equipment Co.

Paints—
Aluminum Co. of America.
American Asphalt Paint Co.
Continental Supply Co.
Cook Paint & Varnish Co.
Detroit Graphite Co.
Eagle-Picher Lead Co.
Sherwin-Williams Co.

Paraffin Wax Plant Equipment—
Carbondale Machine Co.

Pipe—Cast Iron—
American Cast Iron Pipe Co.
Continental Supply Co.
Greenspon's Jos., Sons Iron & Steel Co.
International Supply Co.
U. S. Cast Iron Pipe & Fdy. Co.

Pipe—Lead Chemical and Antimonial—
Eagle-Picher Lead Co.

Pipe—Steel—
Greenspon's, Jos., Sons Iron & Steel Co.
Jarecki Mfg. Co.
Kellogg, M. W., Co.
National Supply Co.
National Tube Co.
Republic Iron & Steel Co.
Ryerson, Jos. T., & Son, Inc.
South Chester Tube Co.
Spang, Chalfant & Co., Inc.
Superior Tube Co.

Pipe—Wrought Iron—
Byers, A. M., Co.
Frick-Reid Supply Co.
Greenspon's, Jos., Sons Iron & Steel Co.
Oil Well Supply Co.
Reading Iron Co.
Superior Tube Co.

Pipe and Nipple Threading Machines—
Bignall & Keeler Machine Works.
Cox & Sons Co., The.
Landis Machine Co.
Ryerson, Jos. T., & Son, Inc.
Standard Engineering Co.

Pipe Clamps (See Clamps—Pipe)

Pipe Fittings (See Fittings)—

Pipe Grips—
Larkin & Co.

Pipe Headers—
National Tube Co.
Newton Process Mfg. Co.

Pipe Line Construction Tools—
National Transit Pump & Machine Co.

Pipe Line Ditchers (See Ditchers)

Pipe Line Equipment—
Gaso Pump & Burner Mfg. Co.

Pipe Screwing Machines—
Buckeye Traction Ditcher Co.

Pipe Suspension Device—
Stearns-Roger Mfg. Co.

Pipe Threading Dies (See Dies)—

Pipe Tools—
Armstrong Brothers Tool Co.
Nye Tool & Machine Works.

Piping—Fabricated—
Kelly & Jones Co.
Midwest Piping & Supply Co.

Piping—Steel & Iron—
Crane Co.
Greenspon's, Jos., Sons Iron & Steel Co.
Power Piping Co.

Pistons—
Guiberson Corp.
Heppenstall Forge & Knife Co.

Pistons—Expansion—
Wilson Oil Tools Corp.

Pistons—Slush Pump—
Guiberson Corp.

Plain End Pipe Couplings (See Couplings—Plain End Pipe)—

Plugs—Bottom Water—
Guiberson Corp.

Polish Rods (See Rods—Polish)—

Portable Drilling Rigs (See Rigs)

Power Pumps (See Pumps)—

Power Units—Portable (See Engines)—

Pre-Heaters—
Newton Process Mfg. Co.

Pulleys—Casing—
Bridgeport Machine Co.

Pulleys—Wood, Iron and Steel—
Dodge Mfg. Corp.

Pulling Machines—
Iron King Mfg. Co.
National Supply Co.
Safety Pulling Machine Co.

Pumping and Pulling Motors—Electric—
Westinghouse Electric & Mfg. Co.

Pumping Equipment—
American Well Works.
Axelson Machine Co.
Goulds Mfg. Co.
Jones, S. M., Co.
Myers, F. E., Bro. & Co.
Northrup Equipment Co.
Oil Well Supply Co.
Prescott Co.
Ratigan, J. P.
Waukesha Motor Co.

Pumping Gear Units—
Nuttall, R. D., & Co.

Pumping Hangers—
Bridgeport Machine Co.

Pumping Jacks (See Jacks)—

Pumping Powers—
Aldrich Pump Co.
Bessemer Gas Engine Co.
Buda Co.
Climax Engineering Co.
Frick-Reid Supply Co.
Jones, S. M. Co.
Kansas City Hay Press Co.
Marion Mch., Fdy. & Supply Co.
National Supply Co.
Oil Well Supply Co.
Pattin Bros. Co.
Reid, Joseph, Gas Engine Co.
Spence Machine Co.
Titusville Iron Works Co.

Pumps—Air Lift—
Ingersoll-Rand Co.

Pumps—Boiler Feed—
Ajax Iron Works.
Fairbanks-Morse & Co.
Gardner Governor Co.
Oil Well Supply Co.
Worthington Pump & Machinery Corp.

Pumps—Centrifugal—
American Well Works.
Dean Hill Pump Co.
Fairbanks-Morse & Co.
Worthington Pump & Machinery Corp.

Pumps—Direct Driven—
Aldrich Pump Co.
Bessemer Gas Engine Co.

Pumps—Electric—
Prescott Co.

Pumps—Fuel Oil Service—
Aldrich Pump Co.
Blackmer Rotary Pump Co.
Northern Fire Apparatus Co.

Pumps—Fuel Oil Transfer—
Aldrich Pump Co.

Pumps—Gear Driven—
Aldrich Pump Co.
Gaso Pump & Burner Mfg. Co.
Lucey Mfg. Corp.
Prescott Co.

Pumps—Pipe Line—
Aldrich Pump Co.
Frick-Reid Supply Co.
Gardner Governor Co.
Gaso Pump & Burner Mfg. Co.
National Transit Pump & Machine Co.
Prescott Co.
Worthington Pump & Machinery Corp.

Pumps—Power—
Aldrich Pump Co.
Dean Brothers Co.
Fairbanks-Morse & Co.
Gardner Governor Co.
Gaso Pump & Burner Mfg. Co.

Myers, F. E. Bro. & Co.
National Transit Pump & Machine Co.
Novo Engine Co.
Prescott Co.
Waukesha Motor Co.
Worthington Pump & Machinery Corp.

Pumps—Refinery—
Aldrich Pump Co.
Dean Hill Pump Co.
Gardner Governor Co.
Gaso Pump & Burner Mfg. Co.
Kinney Mfg. Co.
National Transit Pump & Machine Co.
Northern Fire Apparatus Co.
Worthington Pump & Machinery Corp.

Pumps—Rotary—
Blackmer Rotary Pump Co.
Northern Fire Apparatus Co.
Roots, P. H. & F. M. Co.

Pumps—Sand—
Bridgeport Machine Co.
Larkin & Co.

Pumps—Slush—
Gardner Governor Co.

Pumps—Steam—
Dean Brothers Co.
Fairbanks-Morse & Co.
Frick-Reid Supply Co.
Gardner Governor Co.
Gaso Pump & Burner Mfg. Co.
Lucey Mfg. Corp.
National Transit Pump & Machine Co.
Oil Well Supply Co.
Prescott Co.
Vogt Brothers Mfg. Co.

Pumps—Suction—
Gaso Pump & Burner Mfg. Co.

Pumps—Vacuum—
Bessemer Gas Engine Co.
Clark Brothers Co.
Gaso Pump & Burner Mfg. Co.
Miller Improved Gas Engine Co.
Roots, P. H. & F. M., Co.
Worthington Pump & Machinery Corp.

Pumps—Water—
Aldrich Pump Co.
American Well Works.
Gaso Pump & Burner Mfg. Co.
Northern Fire Apparatus Co.
Prescott Co.

Purifiers—Oil Absorption—
Sharples Specialty Co.

Pyrometers—
Brown Instrument Co.

R

Ratchet Pipe Cutters—
Toledo Pipe Threading Machine Co.

Ratchet Pipe Threaders—
Nye Tool & Machine Works
Toledo Pipe Threading Machine Co.

Ratchet Reamers—
Nye Tool & Machine Works

Ratchet Stocks and Dies—
Nye Tool & Machine Works
Toledo Pipe Threading Machine Co.

Ratchet Wrenches (See Wrenches)

Reamers—
Bridgeport Machine Co.

Receiving Boxes—
Reid, Joseph, Gas Engine Co.

Recorders—Differential Pressure—
Metric Metal Works.

Refinery Equipment—
American Asphalt Paint Co.
American Radiator Co.
Braun, C. F. & Co.
Carbondale Machine Co.
Chicago Bridge & Iron Works
Graver Corp.
Griscom-Russell Co.
Kellogg, M. W. Co.
Newton Process Mfg. Co.
Petroleum Appliance Co.
Petroleum Iron Works Co.
Power Piping Co.
Power Specialty Co.
Reid, Joseph, Gas Engine Co.
Ross-Meehan Foundries.
Smith Separator Co.
Southwestern Engineering Co. Inc.
Southwestern Engineering Corp.
United Iron Works, Inc.
Universal Oil Products Co.
Vogt, Henry, Machine Co.
Walsh & Weidner Boiler Co.
Westcott & Greis.

Refinery Pumps (See Pumps)—

Refractories—Furnace, Stills and Baffles—
Botfield Refractories Co.

Refrigerating Machinery—
Carbondale Machine Co.
Climax Engineering Co.
United Iron Works, Inc.
Vogt, Henry, Machine Co.

Regulators—
Chaplin-Fulton Mfg. Co.
Fisher Governor Co., Inc.
Oil Conservation Engineering Co.
Smith Separator Co.

Rental Service—
Bridgeport Machine Co.

Reversible Clutches—
Bessemer Gas Engine Co.

Rig Irons—
Bradford Rig & Reel Co.
International Supply Co.
Lucey Mfg. Corp.
National Supply Co.
Oil Well Supply Co.
Parkersburg Rig & Reel Co.

Rigs—Drilling, All Steel—
Emsco Derrick & Equip Co.
International Derrick & Equipment Co.
Moore, Lee C., & Co., Inc.

Rigs—Portable Drilling—
National Supply Co.
National Turnbuckle Derrick Co.
Star Drilling Machine Co.

River Clamps (See Clamps)—

Rods—Polish—
Bradford Motor Works.
Jones, S. M., Co.

Rods—Pull—
Axelson Machine Co.
Columbus Sucker Rod Co.
Jones, S. M., Co.
Sheffield Steel Corp.

Rods—Sucker—
Axelson Machine Co.
Columbus Sucker Rod Co.
D. & B. Pump & Supply Co.
Frick-Reid Supply Co.
Jones, S. M., Co.
National Supply Co.
Oil Well Supply Co.
Republic Supply Co.
Sheffield Steel Corp.

Rods—Valve—
Jones, S. M., Co.

Roofing—
Johns-Manville, Inc.

Roofing—Tin Plates (See Tin Plates—Roofing)—

Rope Socket Metal—
Eagle-Picher Lead Co.

Rope—Manila—
Ajax Rope Co., Inc.
Bovaird Supply Co.
Republic Supply Co.
Wall Rope Works, Inc.

Rope—Wire—
Ajax Rope Co., Inc.
American Cable Co.
Bovaird Supply Co.
Bridgeport Machine Co.
Broderick & Bascom Rope Co.
International Supply Co.
Jarecki Mfg. Co.
Leschen, A. & Sons Rope Co.
Wickwire-Spencer Steel Corp.

Rotary Bit Steel—
Andrews Steel Co.
Heppenstall Forge & Knife Co.

Rotary Disc Bits (See Bits)—

Rotary Drilling Equipment—
Climax Engineering Co.
Continental Supply Co.
Frick-Reid Supply Co.
International Derrick & Equipment Co.
Link-Belt Co.
Lucey Mfg. Corp.
Lufkin Foundry & Machine Co.
National Supply Co.
Oil Well Supply Co.
Republic Supply Co.
Titusville Iron Works Co.

Rotary Drive Bushings (See Bushings—Rotary Drive)—

Rotary Lines (See Rope—Wire)—

Rotary Post—
Reed Roller Bit Co.

Rotary Rock Bits (See Bits)—

Rotary Tool Joints—
Bartlesville Supply Co.
Hughes Tool Co.

Rotary Ventilators—(See Ventilators)—

Rubber Belting (See Belting)—

Rubber Hose (See Hose)—

Run Down Tanks (See Tanks)—

Rust Preventatives—
Dearborn Chemical Co.
Eagle-Picher Lead Co.

S

Sand Lines—Manila—
Ajax Rope Co., Inc.

Sand Lines—Wire—
Ajax Rope Co., Inc.
Broderick & Bascom Rope Co.
Wickwire-Spencer Steel Corp.

Sand Pumps (See Pumps, Sand)

Screens—Oil Well—
Layne & Bowler Co.

Screens—Water Well—
Layne & Bowler Co.

Screws—Temper—
Burns Tool Co.

Seamless Steel Couplings (See Couplings—Seamless Steel)—

Securities—Oil—
Pforzheimer, Carl H. & Co.

Separators—Centrifugal—
Miller, Max B. & Co.
Sharples Specialty Co.

Separators—Gas and Oil—
American Tank Co.
Smith Separator Co.

Sheet Lead—Chemical and Antimonial—
Eagle-Picher Lead Co.

Sheets—Corrugated, Black and Galvanized
American Sheet & Tin Plate Co.
Ryerson, Jos. T. & Son, Inc.

Sheets—Steel—
American Sheet & Tin Plate Co.
Republic Iron & Steel Co.
Sheffield Steel Corp.

Sleeves—
Dayton Pipe Coupling Co.
Dresser, S. R. Mfg. Co.

Sleeves—Split—
Dayton Pipe Coupling Co.
Dresser, S. R. Mfg. Co.

Slush Pump Pistons (See Pistons)—

Slush Pump—(See Pumps)—

Smoke Stacks—
Donovan Boiler Works.

Sockets—
Acme Fishing Tool Co.
Bridgeport Machine Co.
Spang & Co.

Sockets—Wire Rope—
Chicago Steel Foundry Co.

Solders—Bar and Wire—
Eagle-Picher Lead Co.

Spark Plugs—
Mosler Metal Products Corp.

Spears—
Acme Fishing Tool Co.

Special Steel (See Steel Special)

Split Sleeves (See Sleeves)—

Sprockets—Power Transmission—
Ajax Iron Works.
Chain Belt Co.

Stands—Vise—
Nye Tool & Machine Works

Stationary Pipe Threading Die Heads (See Die Heads)—

Steam Pumps—(See Pumps)—

Steel—All Kinds—
Ryerson, Jos. T., & Son, Inc.

Steel—Alloy—
Central Steel Co.

Steel—Bit—
Central Steel Co.

Steel—Hot Rolled Strip—
Central Steel Co.

Steel—Special—
Central Steel Co.

Steel Band Wheels (See Band Wheels—Steel)—

Steel Bridges—(See Bridges)—

Steel Bull Wheels—(See Bull Wheels—Steel)—

Steel Castings (See Castings)—

Steel Couplings for Casing, Line Pipe, Drill Pipe and Tubing (See Couplings)—

Steel Crown Blocks (See Crown Blocks)—

Steel Derricks—(See Derricks)—

Steel Fabricators—Structural—
Austin Co.
Braden Co.
Graver Corp.
International Derrick & Equipment Co.

Steel Fittings (See Fittings)—

Steel Pitmans—
International Derrick & Equipment Co.
Moore, Lee C., & Co., Inc.
Slater Brothers Turnbuckle Derrick Co.

Steel Plate Construction—
Chicago Bridge & Iron Works
Graver Corp.
Kaw Boiler Works Co.
Petroleum Iron Works Co.
Tulsa Boiler & Machinery Co.
Vogt, Henry, Machine Co.

Steel Sheet—(See Sheets, Steel)—

Steel Valves (See Valves—Steel)—

Steel Walking Beams (See Walking Beams—Steel)—

Steel Wheels and Tug Rims—
Emsco Derrick & Equip Co.
International Derrick & Equipment Co.

Stills—
Blaw-Knox Co.
Chicago Bridge & Iron Works.
Graver Corp.
Kaw Boiler Works Co.
Kellogg, M. W. Co.
Newton Process Mfg. Co.
Petroleum Iron Works Co.
Vogt, Henry, Machine Co.

Stocks and Dies—
Nye Tool & Machine Works
Toledo Pipe Threading Machine Co.

Structural Steel Fabricators (See Steel Fabricators)—

Stuffing Boxes—
Axelson Machine Co.
Kansas City Hay Press Co.

Sucker Rods (See Rods—Sucker—

Suction Pumps—(See Pumps)—

Sulphuric Acid—
Eagle-Picher Lead Co.

Swab Rubbers—
United States Rubber Co.

Swabs—
Guiberson Corp.
Hoffman Mfg. Co.
Saunders Bros.

Swedge Nipples—
Dresser, S. R. Mfg. Co.
Harrisburg Pipe & Pipe Bending Co.

Swing Joints—
Oil Conservation Engineering Co.

Swivels—
Layne & Bowler Co.
Lucey Mfg. Corp.
Titusville Iron Works Co.

T

Tank Cars (See Cars—Tanks)—

Tank Cars Leased (See Cars)—

Tank Equipment—
Oil Conservation Engineering Co.
Westcott & Greis.

Tanks—Bolted—
American Tank Co.
Butler Mfg. Co.
Gantz Tank Co.
Maloney Tank Mfg. Co.
Parkersburg Rig & Reel Co.

Tanks—Bulk Station—
Columbian Steel Tank Co.
Graver Corp.

Tanks—Cylindrical—
Petroleum Iron Works Co.

Tanks—Elevated Steel—
Chicago Bridge & Iron Works.

Tanks—Field Storage—
American Car & Foundry Co.
American Tank Co.
Donovan Boiler Works.
Graver Corp.
Kaw Boiler Works.
Kewanee Boiler Co.
Maloney Tank Mfg. Co.
Petroleum Iron Works Co.
Pittsburgh-Des Moines Steel Co.
Riter-Conley Co.
Tulsa Boiler & Machinery Co.
United Iron Works, Inc.

Tanks—Horizontal Storage—
Columbian Steel Tank Co.
Graver Corp.
Kaw Boiler Works Co.
Maloney Tank Mfg. Co.

Tanks—Run Down—
Donovan Boiler Works.
Graver Corp.
Kaw Boiler Works Co.
Newton Process Mfg. Co.

Tanks—Truck—
American Tank Co.
Butler Mfg. Co.
Columbian Steel Tank Co.
White Co

Tanks—Underground—
Butler Mfg. Co.
Columbian Steel Tank Co.
Graver Corp.
Kewanee Boiler Co.
Pittsburgh-Des Moines Steel Co.
Tulsa Boiler & Machinery Co.

Tanks—Welded—
American Tank Co.
Chicago Bridge & Iron Works.
Gantz Tank Co.

Taper Taps—
Hughes Tool Co.

Tapes—Measuring for Oil Gauging—
Lufkin Rule Co.

Tee Casing Heads (See Casing Heads)—

Temperature Controllers (See Controllers—Temperature)—

Temper Screws (See Screws)—

Thermometers—Indicating and Recording—
American Schaeffer & Budenberg Corp.
Bristol Co.
Foxboro Co., Inc.
Tagliabue, C. J., Mfg. Co.
Taylor Instrument Co.

Threading Machines—
Bignall & Keeler Machine Wks.
Cox & Sons Co., The
Landis Machine Co.

Thread Protectors—
Spang & Co.

Tin Plates—Bright—
American Sheet & Tin Plate Co.

Tin Plates—Roofing—
American Sheet & Tin Plate Co.

Tires—Automobile—
Continental Supply Co.

Tongs—
Bridgeport Machine Co.
Wilson Oil Tools Corp.

Tongs—Back Up—
Williams, J. H., & Co.

Tongs—Break Out—
Reed Roller Bit Co.
Williams, J. H., & Co.

Tongs—Casing—
Dunn Mfg. Co.
Guiberson Corp.

Tongs—Chain Pipe—
Williams, J. H., & Co.

Tongs—Pipe—
National Transit Pump & Machine Co.

Tongs—Rotary—
Dunn Mfg. Co.

Tongs—Tool Joint—
Guiberson Corp.
Hughes Tool Co.
Reed Roller Bit Co.

Tongs—Tubing—
Dunn Mfg. Co.

Tool Chests—Pipe—
Nye Tool & Machine Works

Tool Joints—
Bridgeport Machine Co.
Federal Supply Co.
Hughes Tool Co.
Lucey Mfg. Corp.
Oil Well Supply Co.
Regan Forge & Engineering Co.

Tool Joint Tongs (See Tongs)—

Tools—Fishing and Drilling (See Drilling and Fishing Tools)—

Tools — Oil Well Drilling (See Drilling and Fishing Tools)—

Torches—
Oxweld Acetylene Co.

Tractor Oil (See Oil—Tractor)—

Tractors—
International Harvester Co. of America.
Rock Island Plow Co.

Transmission Belt—Rubber—
Goodrich, B. F. Rubber Co.

Transmission Lining—
Stanley Belting Corp.

Traveling Block—
Lucey Mfg. Corp.
Regan Forge & Engineering Co.
Wright Mfg. Co.

Trenches—Vertical Boom—
Barber-Greene Co.

Trucks—Motor—
General Motors Truck Co.
International Harvester Co. of America.
White Co.

Truck Tanks (See Tanks)—

Truck Tires (See Tires—Truck)—

Tubes—Boiler, Charcoal Iron—
Byers, A. M., Co.
Reading Iron Co.

Tubes—Boiler Steel—
National Tube Co.
Ryerson, Jos. T. & Son, Inc.

Tubing—
Byers, A. M., Co.
National Tube Co.
Reading Iron Co.
South Chester Tube Co.
Spang, Chalfant & Co., Inc.
Superior Tube Co.

Tubing Catchers—
Dunn Mfg. Co.
Guiberson Corp.

Tubing Elevators (See Elevators, Casing and Tubing)—

Tubular Goods—
Oil Well Supply Co.
Republic Iron & Steel Co.
Spang, Chalfant & Co., Inc.

Tubular Goods—Wrought Iron—
Byers, A. M., Co.
Reading Iron Co.

Turbines for Lighting Equipment
Lucey Mfg. Corp.
Westinghouse Electric & Mfg. Co.

Turbine Generators (See Generators—Turbine)—

Turnbuckle Derricks (See Derricks)—

U

Underground Tanks—(See Tanks)

Underreamer Bit Steel—
Andrews Steel Co.
Heppenstall Forge & Knife Co.

Underreamer Cutter Steel—
Andrews Steel Co.
Heppenstall Forge & Knife Co.

Underreamers—
Bridgeport Machine Co.
Guiberson Corp.
Wilson Oil Tools Corp.

Unions—
Continental Supply Co.
Kelly & Jones Co.

V

Vacuum Pumps (See Pumps)—

Valuations—
American Appraisal Co.

Valves—Blow-off—
Homestead Valve Mfg. Co.

Valves—Brass and Bronze—
Homestead Valve Mfg. Co.
Kelly & Jones Co.
Lunkenheimer Co.
Reading Steel Casting Co.
Walworth Mfg. Co.

Valves—Cast Steel—
Chapman Valve Mfg. Co.
Homestead Valve Mfg. Co.

Valves—Check—
Gaso Pump & Burner Mfg. Co.
Lunkenheimer Co.

Valves—Drop Forged Steel—
Edward Valve & Mfg. Co.
Vogt, Henry, Machine Co.

Valves — Gate — High and Low Pressure—
Chapman Valve Mfg. Co.
Continental Supply Co.
Crane Co.
Darling Valve & Mfg. Co.
Kelly & Jones Co.
Kennedy Valve Mfg. Co.
Ludlow Valve Mfg. Co.
Lunkenheimer Co.
Pittsburgh Reinforced Brazing & Machine Co.
Powell, Wm., Co.

Valves—Iron—
Chapman Valve Mfg. Co.
Lunkenheimer Co.
Reading Steel Casting Co.

Valves—Metal Pump—
Durabla Mfg. Co.

Valves—Relief—Supersensitive—
Davis Regulator Co.

Valves—Steel—
Chapman Valve Mfg. Co.
Edward Valve & Mfg. Co.
Kelly & Jones Co.
Lunkenheimer Co.
Metric Metal Works.
Pittsburgh Reinforced Brazing & Machine Co.
Powell, Wm., Co.
Reading Steel Casting Co.

Valves—Tank Vent—
Oil Conservation Engineering Co.

Valves—Working Barrel—
Atlas Ball Co.
Axelson Machine Co.
Hough, Charles N., Mfg. Co.
Northrup Equipment Co.
Oil Well Supply Co.

Varnishes—
Sherwin-Williams Co.

Ventilators—Rotary—
Swartwout Co.

Vises—Bench—
Nye Tool & Machine Works

Vises—Pipe—
Nye Tool & Machine Works

Vises—Post—
Nye Tool & Machine Works

W

Wagons—Truss Wheel—
Athey Truss Wheel Co.

Walking Beams—Steel—
Moore, Lee C., & Co., Inc.

Water Gauge Cocks (See Cocks)—

Water Pumps (See Pumps)—

Water Softeners and Filters—
Graver Corp.

Water Well Screens (See Screens)

Wax—
Barnsdall Refining Co.
Gulf Refining Co.
Pure Oil Co.

Weight Indicators—
Hughes Tool Co.

Welded Tanks—(See Tanks)—

Welding Accessories—Electric—
Wilson Welder & Metals Co.

Welding and Cutting Apparatus—
Oxweld Acetylene Co.

Welding Machines—Electric—
Wilson Welder & Metals Co.

Welding Supplies—
Oxweld Acetylene Co.

Welding Wire—
Frick-Reid Supply Co.
Oxweld Acetylene Co.
Page Fence & Wire Products Association.
Wilson Welder & Metals Co.

Well Drilling and Fishing Tools—(See Drilling and Fishing Tools)—

Well Drilling Equipment (See Drilling Equipment)—

Well Shooting—
Eastern Torpedo Co.
Zero Hour Torpedo Co.

Wheels—Pipe Cutter—
Nye Tool & Machine Works

Wheels—Steel Automotive—
Budd Wheel Co.

Winches—
Braden Co.
Oil Conservation Engineering Co.

Wire Lines (See Cables—Steel)—

Wire Rope (See Rope—Wire)

Wood Patterns and Models—
Gaso Pump & Burner Mfg. Co.

Working Barrels—
Axelson Machine Co.
Bradford Motor Works.
D. & B. Pump & Supply Co.
Franklin Valveless Engine Co.
Frick-Reid Supply Co.
Hough, Charles N., Mfg. Co.
McGregor Working Barrel Co.
Northrup Equipment Co.
Oil Well Supply Co.

Working Barrel Valves (See Valves—Working Barrel)—

Wrenches—Closet Spuds—
Nye Tool & Machine Works

Wrenches—Drop Forged—
Williams, J. H., Co.

Wrenches—Pipe—
Trimont Mfg. Co.
Walworth Mfg. Co.

Wrenches—Ratchet—
Dresser, S. R., Mfg. Co.
Nye Tool & Machine Works

Z

Zinc Oxide—
Eagle-Picher Lead Co.

Oklahoma-Kansas and Eastern Pipe Line Report

OKLAHOMA-KANSAS
Pipe Line Statement for November

Runs

	Month	Daily Av.
*Prairie Pipe Line Co.	4,080,000	136,000
Gulf Pipe Line Co.	919,468	30,649
Texas Pipe Line Co.	630,558	21,018
Magnolia Pet. Co.	970,726	32,358
Empire Pipe Line Co.	708,677	23,619
Cosden Pipe Line Co.	710,472	23,682
*Sinclair Pipe Line Co.	1,557,000	51,900
*Other lines	8,220,000	274,000
Total November	17,796,801	593,226
Total October	18,416,882	594,092
Difference	620,081	866

Shipments

	Month	Daily Av.
†Prairie Pipe Line Co.	3,850,769	128,359
Gulf Pipe Line Co.	1,137,662	37,922
Texas Pipe Line Co.	819,001	27,300
Magnolia Pet. Co.	1,303,126	43,438
Empire Pipe Line Co.	826,967	27,566
Cosden Pipe Line Co.	741,340	24,711
†Sinclair Pipe Line Co.	2,372,425	79,080
*Other lines	8,520,000	284,000
Total Nov.	19,571,290	652,376
Total October	20,611,139	664,892
Difference	1,039,849	12,516

Stocks

*Prairie Oil & Gas Co.	27,400,000
*Prairie Pipe Line Co.	2,000,000
Gulf P. L. and Gypsy Oil Cos.	6,901,406
The Texas Co.	4,240,338
Magnolia Pet. Co.	6,327,257
Empire Pipe Line Co.	3,207,187
Cosden Pipe Line Co.	1,846,475
*Sinclair Crude Oil Purch. Co.	23,000,000
Carter Oil Co.	16,511,223
*Other lines	10,200,000
Total November	101,633,876
Total October	102,710,918
Difference	977,042

*Estimated. †Prairie shipments include Texas crude oil. Sinclair shipments include Texas and Wyoming crude oil.

Note: Stocks do not include 6,000,000 bbls. of crude oil held in storage on private tank farms and leases.

EASTERN PIPE LINES
Runs From Wells

In the following table will be found the regular receipts from wells by various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for October and November:

	Oct. '25	Nov. '25
Nat. Transit	160,485.98	143,528.17
S. W. Pa. Pipe	88,614.81	79,602.57
Eureka P. L.	369,811.62	318,323.70
Buckeye P. L. (Macksburg)	303,780.86	279,053.92
Buckeye P. L. (Cleveland)	13,981.45	11,362.78
Buckeye P. L. (Lima, etc.)	127,521.41	111,577.13
Indiana P. L.	9,586.89	9,162.90
Cumberland P. L.	292,906.37	279,943.21
N. Y. Transit	20,573.89	16,926.71
Tidewater P. L.	150,134.69	138,009.66
Pure Oil Co.	182,452.25	167,921.44
Emery P. L.	48,556.62	47,005.83
Indian Ref.	86,547.46	77,169.86
Paragon Dev.	28,235.35	28,926.17
Pittsburgh P. L.	7,323.62	.....
Total	1,890,833.27	1,708,514.04
Daily average	60,994.63	59,350.47

Note — Indian Refining Co. also reported other receipts of 331,423.81 bbls. Paragon Refining Co. had other receipts of 130,150.20 bbls. Paragon Development had other receipts of 2,251.89 bbls. Pure Oil had other receipts of 57,348.55 bbls.

Petroleum Deliveries

The following tables exhibit the shipments or regular deliveries of various pipe lines in New York, Pennsylvania, West Virginia, Ohio, Kentucky and Indiana for October and November:

	Oct. '25	Nov. '25
Nat. Transit	397,576.55	372,376.37
S. W. Pa. Pipe	364,951.95	314,769.58
Eureka Pipe	135,027.77	148,352.61
Buckeye P. L. (Macksburg)	133,831.43	135,558.83
Buckeye P. L. (Cleveland)	969.15	971.65
Buckeye P. L. (Lima, etc.)	795,060.85	732,107.13
Indiana P. L.	995,708.07	963,608.00
Cumberland, P. L.	157,374.91	161,755.20
Southern P. L.	651.00	.....
N. Y. Transit	466,894.84	452,743.87
Northern P. L.	73,874.32	87,808.44
Tidewater P. L.	175,398.69	83,545.87
Pure Oil Co.	244,061.70	195,068.59
Emery P. L.	48,308.05	49,512.02
Paragon Ref.	98,916.25	146,231.80
Indian Ref.	378,805.98	399,459.91
Paragon Dev.	32,046.70	30,599.39
Pittsburgh, P. L.	7,077.88	.....
Total	4,507,036.03	4,307,468.26
Daily average	145,388.26	143,582.27

Note—Paragon Development had other deliveries of 525.69 bbls.

Gross Stocks

The gross stocks held by various pipe lines in the oil producing sections of New York, Pennsylvania, West Virginia, Ohio, Indiana and Kentucky at the close of October and November were as follows:

	Oct. '25	Nov. '25
Nat. Transit	964,802.37	1,018,157.25
S. W. Pa. Pipe	721,496.86	734,911.17
Eureka P. L.	1,492,661.69	1,488,359.27
Buckeye P. L. (Macksburg)	244,329.32	213,926.26
Buckeye P. L. (Cleveland)	57,105.89	67,286.51
Buckeye P. L. (Lima, etc.)	3,509,002.32	3,637,920.88
Indiana P. L.	595,464.31	572,199.94
Cumberland P. L.	571,941.31	554,266.94
Southern P. L.	528,343.58	538,905.79
N. Y. Transit	812,350.18	754,325.86
Northern P. L.	735,413.58	629,014.12
Pure Oil Co.	355,276.69	382,570.80
Emery P. L.	26,957.36	23,903.97
Paragon Ref.	200,996.85	184,346.81
Indian Ref.	260,559.26	273,076.94
Paragon Dev.	5,428.40	5,986.04
Pittsburgh P. L.	4,720.44	.....
Total	11,086,850.31	11,068,157.65
Increase	305,097.25	*18,692.66

*Decrease.

Grades of Oil

The following table shows the amount of the different grades of oil held by the eastern pipe lines at the close of October and November showing the gross stocks of the above fields:

	Oct. '25	Nov. '25
Pennsylvania	3,842,909.85	3,918,163.14
Lima	1,135,862.12	1,118,238.47
Kentucky	1,143,060.43	1,181,746.10
Mid-Continent	4,850,093.71	4,770,274.01
Illinois	114,924.20	79,735.93
Total	11,086,850.31	11,068,157.65

Daily Average Runs

The following table shows the daily average runs of the Pennsylvania, Lima and Kentucky oil fields for the past four years:

	1922	1923	1924	1925
January	67,702	75,790	62,628	56,831
February	75,096	71,092	68,023	60,606
March	75,531	76,592	68,721	60,575
April	75,447	75,614	71,058	63,062
May	77,592	77,365	63,942	59,217
June	76,193	77,593	63,230	61,270
July	76,435	71,879	64,208	62,639
August	79,387	76,910	59,942	59,686
September	78,512	72,358	62,930	62,510
October	77,209	76,269	64,976	60,995
November	76,313	70,762	56,282	59,350
December	73,351	69,271	55,814	.....

Daily Average Shipments

The following table gives daily average shipments from the Pennsylvania, Lima and other fields for the past four years:

	1922	1923	1924	1925
January	119,792	171,067	145,518	157,889
February	111,362	164,219	148,732	160,863
March	127,753	185,487	147,098	154,591
April	127,068	170,751	147,611	151,429
May	127,840	177,102	134,997	146,995
June	137,638	173,598	143,010	149,467
July	137,872	168,330	124,187	161,338
August	153,275	142,766	123,120	161,730
September	158,761	137,266	127,325	156,719
October	165,345	134,597	123,170	145,388
November	165,677	131,426	124,400	143,582
December	172,861	139,909	151,392	.....

Gross Stocks

In the following table will be found the gross stocks of the various lines of the Pennsylvania, Lima and Kentucky oil fields including oil received from other lines, at the close of each month for the past three years:

January	14,040,567	12,907,202	11,353,276
February	14,028,437	11,844,068	11,192,924
March	13,873,146	10,906,752	11,158,297
April	13,737,575	10,922,742	11,062,083
May	13,815,622	11,335,309	11,207,562
June	14,541,253	11,544,204	11,093,796
July	14,645,584	12,062,361	11,067,451
August	14,770,539	12,221,676	10,974,481
September	14,803,444	12,206,836	10,781,753
October	14,504,111	12,664,061	11,086,850
November	14,157,726	12,267,830	11,068,158
December	13,444,361	11,583,680	.....

Franklin Pipe Line Co.

The following table exhibits the condition of the Franklin Pipe Line at the close of business for the months named and not counted in the stocks and averages reported above:

1924—	Receipts	Shipmts.	Stocks
October	3,842.40	1,880.60	14,590.32
November	2,700.13	482.89	12,427.56
December	3,120.34	2,659.13	12,888.77
1925—			
January	1,730.86	1,681.15	12,938.48
February	2,702.05	4,564.70	11,075.83
March	3,177.31	3,454.30	11,898.74
April	3,040.41	1,780.11	13,159.04
May	2,814.99	5,719.90	10,254.13
June	3,052.75	1,221.83	12,085.05
July	2,639.34	3,174.10	11,550.29
August	3,216.97	1,577.99	13,189.27
September	2,929.99	5,352.05	10,767.21
October	2,869.75	1,499.34	12,137.62

The Illinois Field

The following table gives the report of the Illinois Pipe Line Co. in Illinois:

Gross stocks, December	2,004,202.01
Runs from wells	635,522.87
Other receipts	493,167.76
Regular deliveries	476,103.17
Other deliveries	584,027.32

The amount of Illinois oil run by the Tidewater Pipe Co. in November was 29,033.43 bbls. Adding these figures to those of the Illinois Pipe Line Co. makes the runs and deliveries as follows:

1924—	Runs	Deliveries
November	650,147.63	521,459.21
December	640,919.23	595,942.28
1925—		
January	695,513.43	572,304.77
February	636,635.20	514,661.53
March	754,335.68	611,348.49
April	622,865.14	637,242.85
May	692,671.94	568,573.62
June	700,090.46	589,535.24
July	724,481.26	564,713.19
August	673,652.38	650,649.97
September	706,434.67	510,697.61
October	706,532.00	633,682.32
November	664,556.30	488,449.19

The Tidewater Pipe Co., Ltd., also delivered in November, 205,948.17 bbls. of Oklahoma oil. The total deliveries of all grades by the Tidewater were 301,840.06.

AVERAGE WEEKLY RECEIPTS OF CALIFORNIA OIL AT ATLANTIC AND GULF PORTS

Average bbls. per week—	ATLANTIC PORTS Baltimore	Boston	New York	Philadelphia	Others	Total	GULF COAST PORTS Galveston	New Orleans Baton Rouge	Port Arthur Sabine Pass	Tampa	Total	Total All Ports
August	25,515	68,432	223,097	35,000	92,806	444,850	.....	35,903	.....	4,067	39,970	484,820
September	17,269	35,931	212,100	36,569	89,600	441,469	.....	36,869	.....	.....	36,869	478,338
October	21,455	29,806	142,388	68,642	41,321	304,612	.....	.....	.....	.....	.....	304,612
November	50,869	68,131	103,131	93,331	66,269	381,731	.....	.....	36,400	5,831	42,231	423,962

AVERAGE WEEKLY IMPORTS OF PETROLEUM AT PRINCIPAL UNITED STATES PORTS

Average bbls. per week—	ATLANTIC PORTS Baltimore	Boston	New York	Philadelphia	Others	Total	GULF COAST PORTS Galveston	New Orleans Baton Rouge	Port Arthur Sabine Pass	Tampa	Total	Total All Ports
August	70,455	62,097	326,515	107,933	175,224	742,224	147,224	228,291	18,515	29,358	423,388	1,165,612
September	70,700	41,531	289,331	61,600	194,531	657,693	115,500	168,469	37,800	14,700	336,469	994,162
October	149,709	94,836	275,933	44,030	160,755	725,291	175,000	207,736	13,752	20,321	416,812	1,142,103
November	136,969	30,331	331,100	70,910	241,731	811,041	91,231	191,569	54,369	43,400	386,569	1,191,610

GROSS PRODUCTION IN THE UNITED STATES FOR 12 MONTHS

1924—		California	Oklahoma	Texas	Kansas	Arkansas	Louisiana	Rocky Mountain	Eastern Fields	Total
December:	Month	18,795,126	16,031,185	11,264,915	2,537,443	3,380,511	1,870,876	2,302,888	3,000,850	59,183,794
	Daily average	606,294	517,135	363,384	81,853	109,049	60,351	74,287	96,402	1,909,155
1925—										
January:	Month	18,743,288	15,462,800	13,790,195	2,520,858	3,278,484	1,774,072	3,627,676	3,065,993	61,263,366
	Daily average	604,622	498,800	444,845	81,318	105,758	57,228	84,760	98,903	1,976,238
February:	Month	16,869,833	13,906,780	11,361,896	2,466,660	2,886,296	1,647,461	2,666,335	2,905,000	54,609,261
	Daily average	602,494	496,635	405,782	88,095	103,082	55,265	95,226	103,750	1,950,333
March:	Month	18,626,009	14,403,716	13,047,068	2,824,524	3,564,473	1,807,517	2,734,235	3,282,000	60,289,552
	Daily average	600,839	464,636	420,886	91,114	114,983	58,307	88,201	105,871	1,944,502
April:	Month	17,959,653	14,055,450	12,683,520	2,971,110	7,560,240	1,695,780	2,744,691	3,157,000	62,927,444
	Daily average	598,655	468,515	422,784	99,037	252,008	56,526	91,490	107,150	2,026,692
May:	Month	18,820,328	14,486,579	13,165,005	3,493,266	11,813,996	1,887,729	2,799,542	3,167,300	69,633,745
	Daily average	607,107	467,309	424,678	112,686	381,097	60,572	90,308	102,171	2,246,250
June:	Month	19,288,135	13,832,970	12,583,740	3,175,440	9,200,372	1,900,506	2,754,498	3,389,000	66,124,661
	Daily average	642,938	461,099	419,458	105,848	306,679	63,350	91,816	109,000	2,133,053
July:	Month	20,411,049	14,263,565	12,390,917	3,686,675	7,835,819	1,898,178	3,129,199	3,348,000	66,963,402
	Daily average	658,021	460,115	396,804	118,925	252,768	61,231	100,942	108,000	2,160,110
August:	Month	21,005,580	14,441,040	11,919,066	3,558,087	7,450,571	1,843,043	3,168,014	3,177,004	66,562,405
	Daily average	677,599	465,840	384,486	114,777	240,341	59,453	102,194	102,484	2,147,158
September:	Month	20,062,763	14,825,040	11,224,830	3,393,270	6,457,950	1,782,870	3,138,300	3,212,000	64,097,023
	Daily average	668,759	494,168	374,161	113,109	215,965	59,429	104,458	107,067	2,136,567
October:	Month	20,015,076	14,921,199	11,378,333	3,477,146	6,409,281	1,872,121	3,394,500	3,379,000	64,846,656
	Daily average	645,648	481,329	367,043	112,166	206,751	60,391	109,500	109,000	2,161,555
November:	Month	19,095,907	14,590,980	10,624,560	3,221,910	5,927,955	1,769,042	3,088,110	3,075,000	61,383,464
	Daily average	636,530	486,366	354,152	107,397	197,599	58,636	102,937	102,500	2,046,115
Total 12 months		229,692,747	175,220,304	145,434,045	37,326,399	75,765,948	21,639,195	34,547,988	38,258,147	757,884,773
Daily average		629,295	480,056	398,449	102,264	207,578	59,285	94,652	104,817	2,076,399

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